

THE EFFECT OF APOLOGETIC ERROR MESSAGES AND MOOD STATES
ON COMPUTER USERS' SELF-APPRAISALS OF PERFORMANCES AND
ACTUAL PERFORMANCES

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ABSTRACT

THE EFFECT OF APOLOGETIC ERROR MESSAGES AND MOOD STATES
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The main aim of this study, in which 310 university students participated, is to investigate whether or not computer interfaces offering human-like apologetic error messages influence users' self-appraisals of performances and actual performances in the computerized environment. For the study, an online instructional material which includes deliberate design problems leading to user frustration was developed. The study is comprised of three phases. In the first phase, based on the CCSARP (Cross-Cultural Study of Speech Act Realization Patterns) coding manual and the studies conducted with the framework provided by the manual, apology strategy sequences were elicited from Turkish participants. Two of these apology strategy sequences were selected for producing two apology error messages. In addition to these apology messages, one plain computer error message was also developed for experimental control. The second phase of the study was conducted to determine whether these three messages were perceived as apologies. It was found out that the two apology

messages were perceived as apologies and the plain computer message was not perceived as an apology. In the third phase these three messages were used to investigate the relationship between mood, self-appraisal of performance and actual performance after the transmission of the apologetic error messages. The findings of this study show that the frequencies of apology strategies preferred in the computerized environment are similar with those utilized in the social context. Statistical analyses also reveal that the influence of apology messages on self-appraisal of performance depends on participants' mood state and the contents of the apology messages.

Keywords: Self-appraisal of performance, actual performance, apologetic error message, mood state and human-like computer interface.

ÖZ

ÖZÜR DİLEYEN HATA MESAJLARININ VE RUH HALLERİNİN BİLGİSAYAR KULLANICILARININ PERFORMANS ÖZ-DEĞERLENDİRMELERİ VE GERÇEK PERFORMANSLARI ÜZERİNDEKİ ETKİSİ

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Bu çalışmanın temel amacı, insan-benzeri özür dileyen hata mesajları sunan bilgisayar arayüzlerinin kullanıcıların gerçek performansları ve performans öz-değerlendirmeleri üzerinde bir etkisinin olup olmadığını incelemektir. Bu çalışmaya 310 üniversite öğrencisi katılmıştır. Çalışma için, kullanıcıları hüsrana uğratacak nitelikte, bilinçlice tasarlanmış hataları içeren bir web tabanlı öğretim materyali geliştirilmiştir. Bu çalışma üç aşamadan oluşmaktadır. Birinci aşamada, CCSARP (Konuşma Edinimi Gerçekleşme Örüntüleri Üzerine Kültürler Arası Çalışma) kodlama elkitabı ve bu elkitabı çerçevesinde yapılmış olan çalışmalar temel alınarak Türk katılımcıların özür strateji sıralamaları elde edildi. Özür ifadesi içeren iki farklı mesaj geliştirmek için, elde edilen özür strateji sıralamalarından iki tanesi seçildi. Bu iki özür mesajına ek olarak, deneysel çalışmanın kontrol grubunda kullanılmak üzere klasik bir bilgisayar hata mesajı geliştirildi. Bu çalışmanın ikinci aşaması, geliştirilen bu üç mesajın

kullanıcılar tarafından özür olarak algılanıp algılanmadığını anlamak amacıyla yürütülmüştür. İkinci aşama sonunda, özür ifadeleri içeren mesajların özür olarak algılandığı, özür ifadesi içermeyen basit bilgisayar mesajının özür olarak algılanmadığı anlaşılmıştır. Özür dileyen mesajların bilgisayar arayüzünde kullanılmasından sonra, kullanıcıların ruh hali, gerçek performansları ve performans öz-değerlendirmeleri arasındaki ilişkiyi incelemek amacıyla, ikinci aşamada özür olarak algılanıp algılanmadığı ölçülen mesajlar çalışmanın üçüncü aşamasında kullanılmıştır. Bu çalışmanın sonuçları, kullanım sıklıkları açısından, bilgisayar ortamında tercih edilen özür stratejilerinin sosyal ortamda kullanılan özür stratejileri ile benzer olduğunu göstermektedir. Bu bulguya ek olarak, yapılan istatistiki analizler, özür dileyen mesajların kullanıcıların performans öz-değerlendirmeleri üzerindeki etkisinin, kullanıcıların ruh halleri ile özür mesajlarının içeriğine bağlı olduğunu ortaya çıkarmıştır.

Anahtar Kelimeler: Performansın öz-değerlendirmesi, gerçek performans, özür dileyen hata mesajı, ruh hali ve insan-benzeri bilgisayar arayüzü.

**This work is dedicated to my family
whose love
and
support
I truly value**

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LIST OF ABBREVIATIONS

APSS	Apology strategy sequence
CSSARP	Cross-cultural study of speech act realization patterns
DCI	Discourse completion test
Exp	Explanation or account
FTA	Face threatening act
H	Hearer
HCI	Human-computer interaction
HHI	Human-human interaction
IFID	Illocutionary force indicating device
OoR	Offer of repair
PoF	Promise of forbearance
S	Speaker
ToR	Take on responsibility

CHAPTER 1

INTRODUCTION

In this chapter, initially the motivation for investigating whether the use of apologetic error messages of computer programs influences the users' self-appraisals of their own performances and their actual performances is presented. Next, in section 1.1 the aim and the scope of the study are presented. In addition, in section 1.2, significance of the study is explained and finally in section 1.3, the research questions are introduced.

1.1 Aim and Scope of the Research

One of the aims of cognitive science from its very beginning of history is how to develop and construct human-like programs and computers that complement human abilities instead of competing with them (De Laere, Lundgren & Howe, 1998). In this thesis, apologizing computer programs are investigated within this tradition with a focus on the way computer users perceive and interpret computer apologies. Accordingly, the dependent and independent variables of the study are as follows: The dependent variables are self-appraisal of performance and actual performance of participants while the independent variables are mood state and apology message type.

Previous works in human computer interaction (e.g., Resnik & Lammers, 1985) have showed that human-like interfaces enhance the effect of computerized feedback on user cognition, including cognitions involving the self such as self-appraisal which is the individual's own assessment or evaluation of his/her

performance. In this study, the effect of apologetic messages and of mood states on users' self-appraisal of performance and actual performance are investigated.

The effect of human-like interfaces on users' actual performances has been studied in the discipline of human-computer interaction (HCI). For example, Resnik and Lammers (1985) elaborated the role of negative computerized feedback in relation to participants' level of self-esteem. The results demonstrated that participants receiving human-like error messages performed considerably better than those receiving machine-like error messages. In order to understand the effect of human-like interface including apologetic error messages instead of automatic computer messages on users' actual performance, actual task performance is used as dependent variable in this study.

One of the important factors affecting cognitive processes is the affective one. In the relevant literature of the past two millennia there exists an almost unanimous consensus proposing that emotions are the consequences of the evaluations of the events or the situations shaped largely by people's motivations (Scherer, 2003). Ellsworth and Scherer (2003) state that emotions arise from attending and interpreting the environment, whereas Scherer (2003) emphasizes the mutual process between cognition and emotion. In his associative network theory, Bower (1981) claims that mood state, a type of affective state, influences the cognitive processing of retrieval of information from long-term memory, whereas Lazarus (1999) asserts that emotion could not occur without cognition and motivation. Based on the links between affect and cognition, effect of mood state, which is a type of affective state- on self-appraisal of performance, which is a type of cognitive process- is investigated in this study.

One of the aims of human-computer interaction (HCI) is to create human-like computer interfaces. Consistent with this purpose, the properties of human-human interaction (HHI) have been expected to be valid for computer interfaces. One of the crucial aspects of human-human interaction is to use apology for maintaining the relationship between the interactants by alleviating frustration

and anger of the frustrated interactant whenever the interaction fails for any of the various reasons. Therefore, the idea that apologetic error messages should be utilized when users encounter a problem caused by computers' inability to carry out a task has been widely accepted among HCI researchers. The problems caused by computers frustrate users. Frustration as a kind of emotion can influence self-appraisal in which cognitive processes are involved. So as to neutralize the likely effect of frustration on self-appraisal of performance, apologetic messages mitigating the users' frustration might be employed in computerized environments.

Hatipoğlu (2004) found that e-mail apologies have some distinctive properties that distinguish them from those utilized in spoken and written languages. In Cakir, Bichelmeyer and Cagiltay (2002)'s study, Turkish participants indicate that expressing emotions may be transferred from face-to-face communication to e-mail communication, whereas American participants indicate that the way to express emotions may be influenced by the medium in which those emotions are expressed. Based on these findings, it is possible to put forward that the apologies preferred in HCI might be different from those preferred in HHI. In order to understand which kinds of apologies are preferred in HCI, a pragmatic analysis is required.

Our study consists of three phases. The first phase was designed to reveal the apology preferences of users in the computerized environment. For the first phase, a web platform was developed which consists of two parts: a lesson and a test. In the first phase, users were asked to follow an e-learning material, and then they took a test related to the lesson. When users were taking the test, they encountered a problem deliberately designed for simulating the problematic situation in which the system would provide an apology because of its inability to carry out the task. When the users completed the web application, a discourse completion test (DCT) was distributed to them. Then, they were asked to write down what kind of apology message they would prefer if they encountered the same problem again in a computerized environment. After apology preferences

of the users were obtained, the preferred apology strategy sequences (APSSs) were determined according to Olshtain and Cohen (1983)' apology classification system in which five different apology strategies were proposed. While eliciting the APSSs, which strategy or strategies a participant's apology preference included was investigated in order to determine the APSS in accordance with the preference. Among the sequences elicited, two of them were chosen for use in the second and the third phase (see Chapter 3 for further details).

The second phase was conducted to understand whether two APSSs chosen to be used in the second phase are perceived as apologies. In addition to these two APSSs, a plain computer error message was also tested for whether it was perceived as an apology or not. The results showed that the preferred APSSs were perceived as apologies, whereas the plain computer message was not. Based on this finding, these three error messages were determined to be used in the third phase (see Chapter 3 for further details).

The third phase aimed to reveal whether the use of apology messages instead of a plain computer error message makes a significant difference on the users' self-appraisals of their performances. In order to do so, the same web platform which was used in the previous phases was employed in the third phase. The major differences between phase 1 and phase 3 were that users were asked to fill the mood state questionnaire and that the users' confidence ratings about their performances were recorded by the system in order to measure their level of self-appraisal of performance. In the third phase, there were three different groups. What makes the groups different from each other was the error messages utilized when the problem was occurred. The system presented one of the messages which were determined in phase 2, when users encountered the pre-designed problem (see Chapter 3 for further details).

1.2 Significance of the Study

Most of the studies which focused on the computer interfaces presenting human-like messages investigated the main effect of human-like messages on computer users without considering the other important factors such as users' mood states and the contents of the messages. There is a significant need for empirical research that can investigate the effect of human-like messages on computer users in relation with their mood states. The findings of this study will hopefully reveal the significance of users' mood states while determining which kind of apologetic error message, as a human-like message, is utilized in the computer interface.

The main aim of the research concerning human-like interfaces is to develop interactive computer systems which have certain characteristics like human beings. According to Nass, Steuer and Tauber (1994), the social rule and dynamics guiding HHI are applied equally well to HCI. This idea becomes one of the main focuses of the research concerning human-like interfaces. However, only a few researches have concentrated on the dynamics guiding HCI with the help of the field of Pragmatics which is defined as a science focusing on the language-using human (Mey, 1993). One of the significance of this study is that a pragmatic analysis is conducted in order to determine which kinds of apologetic error messages are preferred by computer users and to compare the findings of this study with those of other studies related to HHI.

Olshtain and Cohen (1983) propose five different apology strategies and they divide these strategies into two groups: the first group includes the situation specific strategies, whereas the second group consists of the strategies which are employed in all situations in all languages. This distinction expresses that the effect of the apology usage depends on the context in which they are employed. In other words, the contents of apologies are crucial in order to resolve the conflicts and restore harmony between individuals in social environment. Similarly, different apologies in terms of their contents might influence the

individuals differently in the computerized environment. There is a significant need for empirical research that investigates whether the use of apologies including different contents influences computer users in different ways. In this study, two kinds of apologetic error messages are utilized in order to understand whether different apologies influence users' self-appraisal of performances and their actual performances in different ways.

It is expected that the findings of this study will reveal the significance of pragmatic analysis and mood state variable during the design process of human-like interfaces. It is also expected to have several findings which will make important contributions to the researches in the field of Cognitive Science and in the field of the Pragmatics of Human-Computer Interaction.

There are certain methods utilized in order to reveal the dynamics of HHI. One method is that two or more people are placed in a controlled environment and their interactive behaviors are observed, recorded and analyzed. In spite of its impressive external validity, it has some serious internal validity problems. According to Forgas, East and Chan (2007), this method only allows the study of explicit, observable behaviors as dependent variable but not the study of the internal, cognitive and affective processes of individuals in interpersonal behaviors. Forgas, East and Chan (2007) proposes that using a computer in studies, which concentrate on cognitive and affective processes of individuals as they engage in interpersonal behaviors, allows careful recording and analysis of important cognitive variables. Considering that computer-mediated interaction is used in this study, it can be said that the findings of this study will provide important contributions to HHI.

1.3 Research Questions

The research questions are the following.

- Which apology strategy sequences are preferred by the users during their interaction with the computer?
- Is there any significant difference between the real-task performances of the computer users who received an apologetic message and of those who received a plain message?
- Is there any significant difference among the users' real-task performances in the computerized environment with regard to their mood states?
- Is there any significant difference between the self-appraisals of performances of the computer users who received an apologetic message and of those who received a plain message?
- Is there any significant difference among the users' self-appraisals of performances in computerized environment with respect to their mood states?
- Is there any relationship between the computer users' self-appraisals of performances and their response time after the transmission of the apologetic error messages?

In this study, these questions are posed and an attempt to answer them is undertaken.

CHAPTER 2

LITERATURE REVIEW

An overview of the research on the effect of apologetic error messages on users' self-appraisals of performances while interacting with a computer program in relation with cognitive processes is needed to further explain the following topics: the relationship between cognitive science and human-computer interaction (see section 2.1), emotions (see section 2.2), emotions and cognition (see section 2.3), politeness (see section 2.4) and human-like interfaces (see section 2.5).

2.1 Human-Computer Interaction and Cognitive Science

Von Eckardt (2003) roughly characterizes cognitive science as a multidisciplinary science based on the idea that “the human mind is a kind of computer which processes information in the form of mental representations” (p.552). In his well-known article, Norman (1980) lists twelve issues of cognitive science. Those are; belief systems, emotion, learning, performance, consciousness, memory, skill, development, language, perception, thought and interaction. One of the important views related with the interaction between human and computers is Licklider (1960)'s “Man-Computer Symbiosis” which proposes the cooperative interaction between man and electronic computers. The main aim of man-computer symbiosis is to enable man and computers to cooperate in processes of thinking such as decision making.

Preece, Rogers and Sharp (2002) explain why cognition is important for human-computer interaction design. They state that cognition is what goes on in our heads when we carry out everyday activities. Cognition involves cognitive processes such as attention, perception, recognition, memory, learning, reading, speaking, listening, problem solving, planning, reasoning and decision making. All these processes are directly related to our daily life activities. While many of these cognitive processes are independent, they might be activated in order to accomplish a task. Hence, in one activity more than one cognitive process can be activated for completing a task. In Preece, Rogers and Sharp (2002), the similarity between everyday activities in the physical worlds and the digital worlds are mentioned. They assert that there is no difference between learning an activity in the physical world and in the digital environment in terms of cognitive processes activated while completing a task. In the digital environment, if the aim is to learn a topic from the digital material, people follow the same procedure just as they do in the physical environment. As the significance of the digital environments in daily life activities has been widely accepted, the ways to perform the activities have started to change. Today, an increasing number of activities is executed in the digital environment. It may be argued that the same cognitive processes are engaged in both activities in the physical world and in the digital world. Because of this similarity, according to Preece et al (2002), the knowledge about everyday psychology should be applied into human-computer interaction design. One approach to do so in the digital environment is to emulate the strategies and methods people commonly use in the physical world.

Norman (1988) states that everyday actions in the physical world include two main aspects: doing something and checking. These are called execution and evaluation respectively. The execution side of actions consists of determining the goal, forming the intention, specifying the action and executing the action, whereas the evaluation side of the action includes perceiving the state of the world, interpreting the state of the world and evaluating the outcome. Norman (1988) asserts that people in action follow these seven stages (four from execution, and three from evaluation) presented in Figure 2.1.

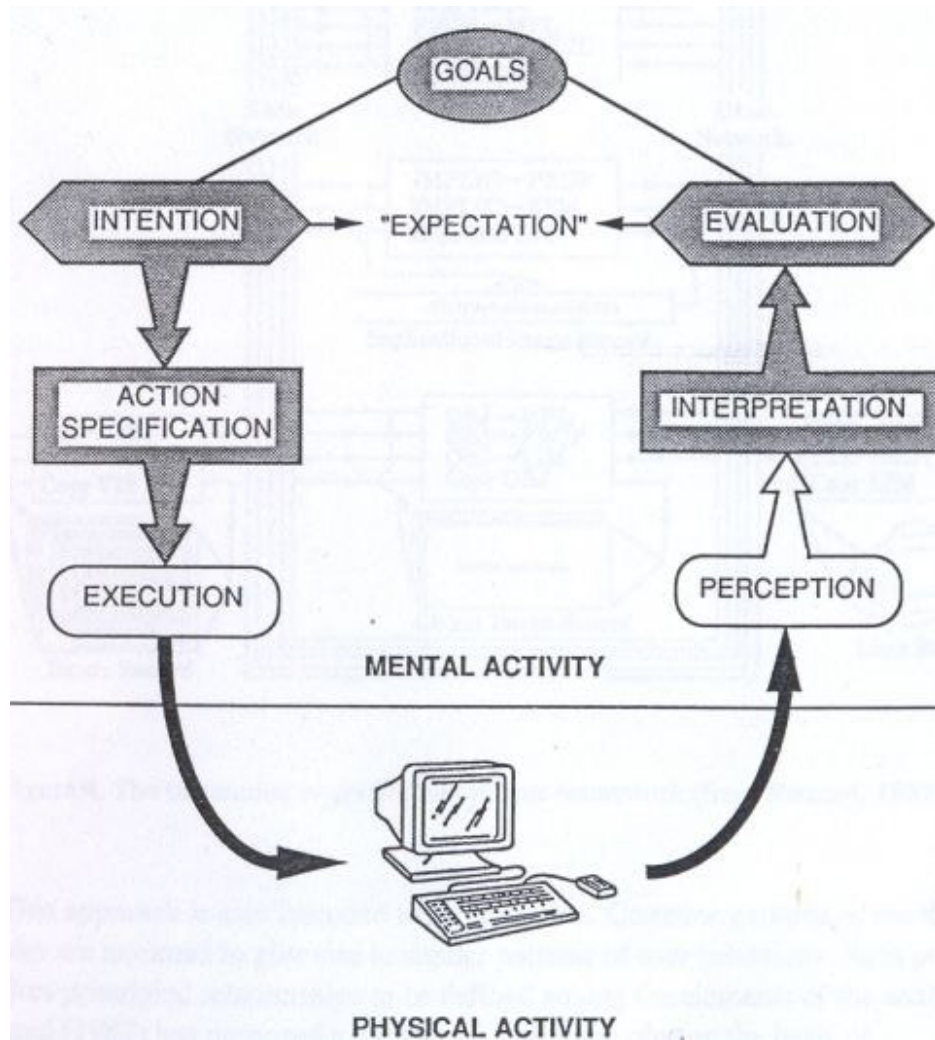


Figure 2.1 Seven stages of user activity (Reprinted from Barnard, 1991,p.168)

Such behaviors are required following these stages in sequence, whereas most behavior does not need to follow the stages in a definite order. When people follow the stages, there might be two different gulfs which distinguish mental states from the physical ones. If there is a difference between the intentions and allowable actions, the gulf which is called “gulf of execution” occurs. The other gulf, “gulf of evaluation”, occurs when there is a difference between interpretation of physical state of the system and the intentions or expectations about an action. Keeping in mind that technology becomes an important part of our everyday actions, it is inevitable for humans to encounter these two types of gulfs while utilizing technology or interacting with the computer. When users

encounter these two gulfs, they either take the blame on themselves or come up with the decision that they are not capable of utilizing devices which does not work properly.

HCI aims to deal with how human beings interact with the computer in terms of cognitive processes activated during the interaction. Designers of the computer interfaces base their attempts on the idea that if designers consider the findings of cognitive psychology in terms of cognitive processes while interacting with the computer, it can be possible to make predictions about user performance (Preece et al., 1994). In that sense, cognitive science and HCI has gone in tandem. According to Oatley (1994) the relationship of cognitive science and HCI is on the following lines:

The area of human-computer interaction is concerned with how computers are used, and with ways of facilitating interactions between people and computers. If cognitive science is the study of the representation and use of knowledge in acting, seeing, thinking, conversing, and so on, one of its applications is 'cognitive engineering': applying this science to the design of information technology. (...) The new understanding of the applied cognitive psychology of human-computer interaction are attempts to allow more people to approach computers with confidence –to allow us all to use them easily and pleasurably, just as now a high proportion of people are able to use the technologies of reading and writing (p.161).

In the editorial of the special issue of the International Journal of Human-Computer Studies dedicated to the relationship between cognitive science and HCI, Pollitzer and Edmonds (1996) provide the case of designing menus in a way to reduce cognitive costs of the design. The user of a design with low costs does not spend much time for finding the locations and meanings of menu items. Pollitzer and Edmonds (1996) suggest that one of the main contributions by cognitive science for HCI is its reframing of HCI research problems as information processing problems with an eye for cognitive structures of the users. Furthermore, cognitive science provides the cognitive limitations and capacities of the user that would be crucial in designing computer-based systems. In this vein, Lansdale, Scrivener and Woodcock (1996) apply models of spatial cognition to the design of pictorial databases, Mantovani (1996) develops an HCI framework based on the notion of mental models, while in a recent study,

Ang, Zaphiris and Mahmood (2007) provide a qualitative study of cognitive load occurring in multiplayer online role playing games.

Likewise, Scaife and Rogers (1996) focus on the cognitive processes going on while interacting with graphical representations in computer-based systems. Papanikolaou et al. (2006) present an experimental study aiming to model the interaction on a web-based learning environment with regard to the cognitive styles, while in Cegarra and Hoc (2006) the notion of cognitive styles is introduced upon establishing a balance between task requirements and cognitive resources in computer-assisted troubleshooting diagnosis. Dalal and Casper (1994) add to the notion of cognitive style concepts like user satisfaction, user confidence and trust in the design as central elements of the effectiveness of computer-based systems. The use of the computer-based system is the most central concept in HCI (Carroll, 1997; Hartson, 1998; Hollan, 2001). The criterion of the ease of use is taken into account. This criterion necessitates knowledge of the users' cognitive properties. de Greef and Neerincx (1995) emphasize the significance of the properties such as users' cognitive limitation, ease of learning and the cognitive cost of using the system for designing computer-based systems, where HCI and cognitive science meet. Actually, even from the very beginning of its history, theories of HCI have been heavily influenced by those in cognitive psychology (Carroll, 1997; Hartson, 1998).

One of the major attempts in HCI is the employment of designs that allow more human-like communication where human-like figures are used (Burgoon et al, 2000, Ritter & Young, 2001). Suchman (1987) mentioned the term "sociability of computers" and pointed out that properties of HHI (e.g., dialogue, conversation, and so forth) should be considered in describing what goes on between people and machine. Parallel to this development in HCI, Lisetti and Schiano (2000) point out a conspicuous trend from 'adapting people to computers' approach to 'adapting computers to people' approach. This paradigm shift occurred in terms of interface design methodology from the design-centered approach focusing on the efficiency of the interface without regarding the user profile to user-centered

approach concentrating on the users' needs while designing the interfaces. However, in the literature, there has not been much discussion concerning which kinds of users' needs should be considered to develop a more human-centered interface interacting with users when their intended tasks are not executed owing to the product's inability. One example of these kinds of situations, as relevant to the topic of this thesis, is error messages presented by the computer when a problem occurs in the interface. Most of the error messages utilized in the computer interface are short and inhuman error messages which glaringly unfold the nature of computer-centered design when users encounter a problem during the interaction with the interface (Tzeng, 2004). As an alternative to the computer-centered interface in terms of error messages, the human-centered interface which present error messages including emotional expressions such as apologies are suggested for failing to execute and sympathy for the frustration that the user may have experienced (Nielsen, 1998; Tzeng, 2004).

There is a growing interest in emotions in Information Age throughout which cognitive science has been a significant component. Diaper (2004) criticizes the neglect of the consideration of affective processes of human beings in inspirations of HCI by psychology:

Notwithstanding the need in HCI to consider affective, social, organizational, and other such issues, most of the psychology in HCI and in current approaches to task analysis focuses on human cognition, and it is human cognition that is the main ingredient of user models in HCI. The point to recognize is that cognitive psychology of people is much more complicated than, for example, the information-processing abilities of computer systems and that this creates a fundamental problem for task analysis. If an analyst cannot understand the operation of a basic system component (such as the human element), then it is nigh impossible to predict how the various things in a system will interact and produce the behavior of the system (p.21).

Lisetti and Schiano (2000) stressing the importance of affective states for many of the cognitive processes, propose that questions such as "is the user satisfied, more confused, frustrated, or simply sleepy?" are indispensable for effective HCI designs. They add that

While making decisions, users are often influenced by their affective states: for example, reading a text while experiencing a negatively valenced emotional state often

leads to a very different interpretation than reading the same text in a positive state. A computer interface aware of the user's current emotional state can tailor the textual information to maximize the user's understanding of the intended meaning of the text (Lisetti and Schiano, 2000, p.199).

In order to provide better understanding concerning the role of emotions on cognitive processes, firstly emotions and then the relationship between cognition and emotion are presented in the following sections.

2.2 Emotions

Emotions have many aspects involving feelings, experience, physiology, behavior and cognitions (Ortony, Clore, & Collins, 1988). In 1980, Donald Norman identified the topic of emotion as one of twelve major challenges to cognitive science (Norman, 1980). According to him, the study of emotion is an important field that would be likely to provide crucial findings for the study of cognition. Ortony, Clore and Collins (1988) state that while some emotions, (e.g. disgust), require much less cognitive processing, others involve much more (e.g. shame). Regardless of this difference in the levels of cognitive processing, emotions always involve some degree of cognition. Ekman (1999), who stresses the influence of emotions on thoughts, describes certain characteristics which differentiate 'basic emotions' from other affective phenomena. One of these characteristics is 'distinctive universal signals' such as distinctive facial expressions. According to Ekman (1971, 1992) the existence of common facial expressions across cultures supports the notion of the universality of facial displays of emotions which led him to propose six basic emotions. The identified distinctive universal emotions are surprise, anger, fear, disgust, sadness and enjoyment (Ekman 1993).

Conversely, Ortony, Clore and Collins (1988) reject Ekman's proposal for a set of 'basic' emotions. According to them, there are more than six emotions which are distinct and equally basic. They state that some emotions (e.g. fear, anger, sadness, and enjoyment) can be found in all cultures but this does not make them

basic emotions. They explain this idea with the following analogy: “toe nails might be found in all cultures too, but that would not be sufficient to render them anatomically basic” (Ortony, Clore, & Collins, 1988, p. 25). While they refuse the notion of six basic emotions, they support the idea that some emotions are more basic than others. The reason behind this idea is that “some emotions have less complex specifications and eliciting conditions than others.” (Ortony, Clore, & Collins, 1988, p. 28). Eliciting conditions are specified in terms of variables which can modulate the intensity of emotions. These variables are global variables that affect all emotions and local variables that influence subset of emotions. Based on these variables, O’Rourke and Ortony (1994) provide emotion types (see Table 2. 1).

Table 2. 1 Emotion Types

Emotion Types		
Group	Specification	Types(name)
well-being	Appraisal of event	pleased (joy) displeased (distress)
Fortunes-of-others	Presumed value of an event affecting another	pleased about an event desirable for another (happy-for) pleased about an event undesirable for another (gloating) displeased about an event desirable for another (resentment) displeased about an event undesirable for another (sorry for)
Prospect-based	Appraisal of a prospective event	pleased about a prospective desirable event (hope) pleased about a confirmed desirable event (satisfaction) pleased about a disconfirmed undesirable event (relief) displeased about a prospective undesirable event (fear)

Table 2.1 (continued)

		displeased about a confirmed undesirable event (fears-confirmed)
		displeased about a disconfirmed desirable event (disappointment)
Attribution	Appraisal of an agent's action	approving of one's own action (pride) approving of another's action (admiration) disapproving of one's own action (shame) disapproving of another's action (reproach)
Attraction	Appraisal of an object	liking an appealing object (love) disliking an unappealing object (hate)
Well-being/ attribution	Compound emotions	admiration + joy -- gratitude reproach + distress -- anger pride + joy -- gratification shame + distress -- remorse

When the table is investigated, it is easily understood that the appraisal processes have an important role in emotions. Based on the table, it can be mentioned that appraisal of an event leads to joy and distress; appraisal of a prospective event results in hope, satisfaction, relief, fear and disappointment; appraisal of an object causes love and hate; and appraisal of agent's action leads to 'attribution emotions' such as pride, admiration, reproach and shame. While shame occurs when people disapprove of their own actions and attribute the negative effects of their actions to themselves, reproach occurs when people disapprove of others' actions and attribute the negative effects of the actions to others. The proposal that attribution emotions are crucial for the situation in which use of apology is

required in order to alleviate the anger and frustration of mistreated people is among the ideas that forms the background of this thesis.

In the following section, the relationship between cognition and emotion is investigated with respect to the appraisal processes and attribution processes because the types of emotions which most probably lead to the use of apology statements in interpersonal communication relate to appraisal and attribution¹.

2.3 Emotions and Cognition

Two different approaches concerning the cognition-emotion relationship are presented in this section. These two approaches deal with how cognition influences the affect including appraisal theories and attribution theories.

2.3.1 Appraisal Processes in Emotion

Ellsworth and Scherer (2003) state that people's perception of the situation or event leads to their emotions. Feeling and thinking have a relation with each other. Emotions arise from attending and interpreting the environment and they influence thinking. In other words, from the appraisal theorist's point of view, emotions include pattern of perception and of interpretation.

When people interpret an event, they ask appropriate questions relevant to the situation and the answers to the questions determine the emotions people have. Different combinations of answers to the following questions characterize different emotions (Scherer, 2003): Is this important to me (concern relevance)? Do I understand what is going on (certainty, predictability)? Is something impeding my progress toward a goal? What causes this to happen (agency)? Can this be controlled (controllability)? Has social norm been broken (compatibility with standards)? For example, the subjective experience of fear is the feeling of

¹ In this study the attribution theories of emotion were considered as the theoretical background of the study and they were not employed for empirical purposes.

uncertainty, an obstacle impeding the progress toward goal, uncontrollability, and incompatibility with standards about what is happening.

The proponents of the idea that there is a central role of 'appraisal' in eliciting or differentiating emotional reactions propose that subjective evaluations of the significance of the events lead to emotions (Scherer, 2003). Since the evaluation process of the significance of the events activates such decision-making processes, appraisal theories places too much emphasis on cognitive processes.

As an appraisal theorist of emotion, Lazarus states that cognitive appraisal, evaluation, has a key role on emotion. Lazarus (1999) also asserts that cognition, motivation and emotion are always associated and interdependent. He mentions the trilogy of mind in which there is a real difference between emotion and the other two functions, cognition and motivation: "Thought without motivation is emotionless" (p.10). Lazarus thinks that thinking can occur without emotion, but emotion is not independent from meaning. In addition, emotion occurs after the previous emotional state in the continuous flow of cognitive, motivational and emotional processes. In other words, from Lazarus's point of view (1999), cognition is always involved in emotion.

Lewis and Granic (1999) claim that the relationship between cognition and emotion is not linear. The relationship begins with the interpretation of the event encountered, appraisal process, and consequences of the evaluation process give rise to emotions. The emotions people have after the first appraisal leads to a new appraisal process and its consequence are enhanced by emotions, whereby emotions are continuously enhanced by changes in appraisal. This shows that the relation between cognition and emotion is a two-way causal relation. Lewis and Granic propose that when the number of appraisal chains increases, coordination of cognitive and emotional processes occurs which means that cognitive and emotional processes become synchronized through recursive loop. To sum up, they assert that cognition and emotion are inseparable.

2.3.2 Attribution in Emotion

Attribution theories do not deal with the actual cause of the events, but they cope with the perceived cause of the events (See Figure 2. 2).

There is a direct link between cognitive theories and attribution theories in terms of the central assumption that cognition has a role in the evaluation of the stimulus in triggering a reaction (Försterling, 2001). Attribution theories investigate how the information evaluated is employed to draw causal conclusions.

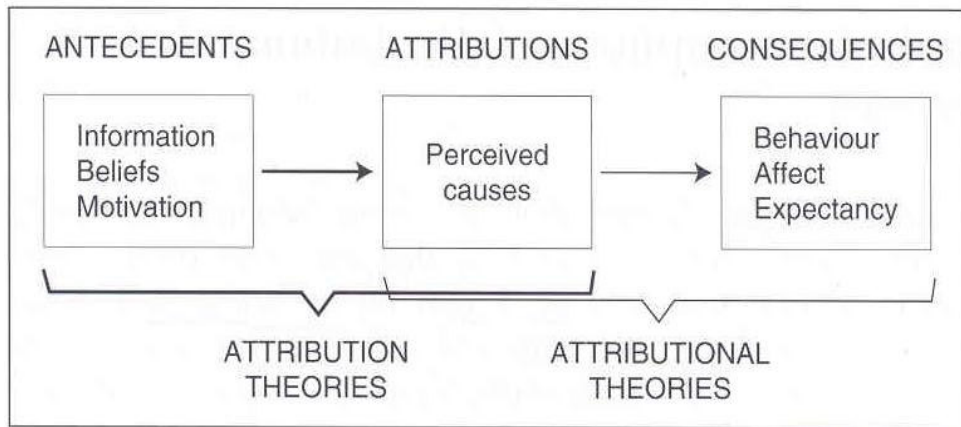


Figure 2. 2 The basic structure of attribution conception (Reprinted from Försterling, 2001, p.9)

According to attribution theorists, individuals have some schemas including certain type of information related to specific action in terms of effect-cause relations. If an individual encounters an event consistent with one of the existing schemas, s/he knows what will happen so s/he automatically forms the cause-effect relation. Therefore, the reason of the cause is perceived without detailed causal search for this kind of situation. On the other hand, if an individual faces an event which is not consistent with any of the existing schemas, s/he realizes that there is a problem. Hence, s/he feels that existing knowledge is not enough to understand the real reason of the event. This makes him or her revise existing schemas for unexpected events (Försterling, 2001).

In the history of attribution theories, there were certain attempts to classify attributions. One of them proposes that causal factors of a behavior are differentiated with respect to whether the factor is “internal” or “external” (Malle, 2004). For instance, provided that a person explains that the reason of the failure is due to lack of effort or lack of ability, s/he attributes the failure to the internal factors. In contrast, if the task difficulty is mentioned as a factor for failure, the attribution made is external. The other classification is based on whether the causes are perceived as being “stable”. Whereas certain causes are stable, i.e. ability, others such as effort change over time. In addition to these two different classification methods, attributions are differentiated considering these two methods together. According to this approach, there are four kinds of attributions: (1) external-stable, i.e. task difficulty, (2) external-variable, i.e. luck, (3) internal-stable, i.e. ability, (4) internal-variable, i.e. effort (Weiner et al., 1971 as cited in Försterling, 2001).

Attribution theories state that the controllability of the event is very important in order to determine the direction of the attribution. When the event is controllable by an action, the person is responsible to act to control the event (Försterling, 2001). For example, an individual has a low ability on a task, but s/he can be successful by employing high effort. In this situation other individuals think about the person positively. In contrast, for the situation in which s/he fails because s/he did not show high effort on the task, other individuals think about the person negatively. Here, effort is controllable, but s/he did not control the situation by showing high effort. Therefore, the reason of the failure is attributed to the individual. This is a kind of internal attribution.

Attribution theory passes one step further of appraisal theories of emotion. As stated before, appraisal theories state that evaluation of an event leads to emotion. Appraisal theories propose that people evaluate whether or not they achieved the pre-determined goal as a first step. The interpretation of the performance leads to outcome-dependent emotions which are classified as failure-dependent emotions (displeased and unhappy) and success-dependent

emotions (satisfaction, happiness, and “feeling good”). As a second step, people make an attribution for the outcome. Based on the attribution, attribution-dependent emotions are triggered. If the failure as an outcome is attributed to ability, people will feel “incompetence”. If they attribute failure to “task difficulty”, this leads to the emotion of surprise. The dimension of the attribution is determined as a last step, which gives rise to another kind of emotion. In the attribution process, especially during the evaluation of the performance and determining the dimension of the attribution, cognitive processes are activated. Figure 2.3 shows the cognitive (attributional) model of achievement behavior.

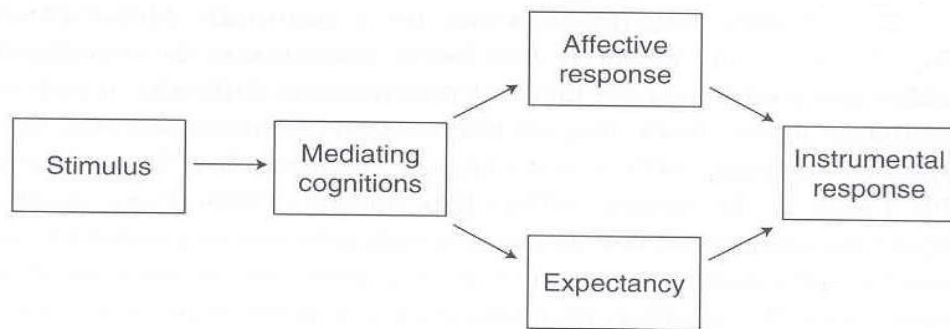


Figure 2.3 The cognitive (attributional) model of achievement behavior (Reprinted from Försterling, 2001, p.119)

The other important point which meet attribution and cognition in the same line is the concept of ‘self’. The meaning of ‘self’ is very crucial in terms of cognition. In order to realize one’s own action, to evaluate its consequences, and to attribute a responsibility of the action, a child must be capable of owning his or her behavior (Lewis, 1999). Being capable of taking responsibility for behaviors requires self-evaluation. During evaluation certain cognitive processes are activated. The results of self-evaluation lead to emotions, the type of which depends on the direction of the attribution. If a child takes the responsibility of the action, the direction of the attribution is internal and this causes feelings of shame. If a child does not take the responsibility of the action and refuses to accept the responsibility, the direction of the attribution is external and this does not cause any feelings of shame.

The feeling of shame or this kind of attribution emotions is experienced after an agent makes something ‘blameworthy’ which causes him/her to disapprove of his/her action; whereas an agent feels reproach if s/he disapproves of others’ actions which are ‘blameworthy’ (Ortony, Clore, & Collins, 1988). An agent’s disapproving of his/her action regrets an undesirable event and the way to explain regret is to use apologies which are admissions of ‘blameworthiness’ (Leech, 1983; Schlenker & Darby, 1981). On the other hand, an agent’s disapproval of another’s action results in the feeling of anger and the way to alleviate his/her anger for the other actions is to offer an apology.

The content of apologies can range from a perfunctory “pardon me” to more detailed expressions that involve a statement of apologetic intent, an expression of remorse, an offer to help, self castigation, or a direct attempt to obtain forgiveness (Schlenker & Darby, 1981, Tzeng, 2004). The content of an apology is very crucial in order for an apology to be viewed as convincing (Gooder & Jacobs, 2000). So as to reveal which kind of apologies in terms of content are utilized or preferred for certain situations or cultures, various studies were conducted in politeness research (e.g. Abadi, 1990; Sugimoto, 1998; Suszczynska, 1999; Trosborg, 1987; Wouk, 2006).

In this section, the relationship between cognition and emotion was presented by concentrating on the topics concerning appraisal processes in emotion and attribution in emotion. In the following section certain views of politeness relevant to this thesis, the apology classification system developed by Cohen and Olshtain (Olshtain & Cohen, 1983) and certain studies on apologies are presented.

2.4 Politeness

Bharuthram (2003) lists four views of politeness. The first one is the social norm view, which considers politeness as an issue of social norms. The second one is the conversational maxim view, which explains politeness phenomena as a

process involving conversational maxims inspired by Grice (1975). Inspired by Grice (1975)², Leech (1983) proposes a politeness principle which is employed to eliminate communicative discord within interaction³. Following Leech's Politeness Principle, eliminating communicative discord within interaction seems to be a major aim in constructing more humane HCI designs. Leech (1983) states that the Politeness Principle consists of the following maxims:

“(I) Tact maxim

Minimize cost to other. Maximize benefit to other.

(II) Generosity Maxim

Minimize benefit to self. Maximize benefit of other.

(III) Approbation Maxim

Minimize dispraise of other. Maximize praise of other.

(IV) Modesty Maxim

Minimize praise of self. Maximize dispraise of self.

(V) Agreement Maxim

Minimize disagreement between self and other. Maximize agreement between self and other.

²Grice's Cooperative Principle (CP), in which four maxims incorporated, is one of the main concepts in pragmatics (Hatipoglu, 2003). Grice (1975) argued that people feel that conversations should be guided by four basic principles that involve the rules for polite interaction: Quantity, Quality, Relation and Manner.

a)The Maxim of Quantity:

Each interactant in an interaction should make his/her contribution only what the conservation demands, not more informative than is required.

b) The Maxim of Quality:

Interactants should say things that are true.

c) The Maxim of Relation

What interactants say should clearly be relevant with the purpose of the conversation.

d) The Maxim of Manner

Contributions to the interaction should be obvious.

³ Further revisions have been made in Leech's theory in his recent publications but this literature review will not delve into details for the sake of the topic of this thesis. Likewise, the discussions over whether an intentional model of human communication or an interactive model of human communication is more explanatory for pragmatic processes (cf. Haugh, 2007) seem not to be relevant to this thesis since the conversation between the design and the user is not extended; the interaction only involves a transmission of feedback message.

(VI) Sympathy Maxim

Minimize antipathy between self and other. Maximize sympathy between self and other”

(Leech, 1983, p.132).

Among Leech’s maxims, tact maxim, approbation maxim, modesty maxim, agreement and sympathy maxim are relevant to the computerized environment in which apologies offered by the computer to the users are utilized for minimizing cost to the user (tact maxim), minimizing dispraise of the user (approbation maxim), maximizing dispraise of the computer (modesty maxim), minimizing disagreement between the user and the computer (agreement maxim), and minimizing antipathy between the user and the computer.

The third view listed by Bharuthram (2003) is the conversational-contract view which considers politeness as an act specifically affected by conversational contracts which are similar to social norms, but differ from them as they are open to online negotiation. The fourth one is Brown and Levinson’s face-saving view which resorts to central notions such as face, face threatening acts, face wants, positive face, negative face etc. (Bharuthram , 2003).

Brown and Levinson (1987) propose that much as the notion of politeness is open to much cultural variations, it is still possible to put forward universals pertaining to politeness. They propose an explicit model of politeness which is claimed to be valid across cultures. The basic concepts on which Brown and Levinson build their politeness theory are model person, face and face threatening acts. The model person is a fluent speaker of natural language and s/he is granted with the properties of rationality and face. According to Brown and Levinson (1987), face, the second concept, is a universal notion. More specifically, Brown and Levinson says:

Central to our model is a highly abstract notion of ‘face’ which consists of two specific kinds of desires (‘face-wants’) attributed by interactants to one another: the desire to be unimpeded in one’s action (negative face) and the desire (in some respects) to be approved of (positive face). This is the bare bones of a notion of face which (we argue) is universal, but which in any particular society we would expect to be the subject of

much cultural elaboration. On the one hand, this core concept is subject to cultural specifications of many sorts- what kinds of acts threaten face, what sorts of persons have special rights to face-protection, and what kinds of personal style (in terms of things like graciousness, ease of social relations, etc.) are especially appreciated. On the other hand notions of face naturally link up to some of the most fundamental cultural ideas about the nature of the social persona, honor and virtue, shame and redemption and thus to religious concepts (p.13).

As mentioned above, the two kinds of face depict two facets of the interaction: positive face and negative face. Whereas positive face is the desire to be accepted and appreciated by others, negative face is the desire to have the freedom to act without being impeded.

The third concept shaping Brown and Levinson's politeness theory is face threatening acts (FTAs) which are likely to damage another person's face. FTAs can be classified as four groups: FTAs threatening hearer's (H) negative face, FTAs threatening H's positive face, FTAs threatening speaker's (S) negative face and FTAs threatening S's positive face.

The acts that threaten the negative face of H can be the acts that force the H to do something by impeding the H from doing what s/he really wants to do. *Giving advice, dares, suggestions, warnings and requests* are the acts that threaten H's negative face (Brown & Levinson, 1987).

The acts that threaten the positive face of H can be the acts indicating that S does not consider the H's thoughts, feelings and wants. *Expression of disapproval, complaints, and criticisms* are the examples of the acts threatening H's positive face because these acts are the indicators of which the S has negative evaluations about H (Brown & Levinson, 1987).

Accepting H's apologies and thanks can be the acts that threaten S's negative face because H's apologies and thanks might be accepted by S with the feeling that the S has to minimize the H's transgression. Moreover, FTAs that directly damage S's positive face involve *apologies, acceptance of a compliment, breakdown of physical control over body, self-humiliation, admission of guilt or responsibility, and emotion leakage*.

In order to mitigate FTAs, interactants can choose from a set of five strategies: (1) Bald-on-record strategies, (2) positive politeness strategies, (3) negative politeness strategies, (4) off-record strategies, and (5) don't do the FTAs. These five strategies are numbered with respect to their degree of politeness in order. For example, negative politeness strategies are more polite than positive politeness strategies.

Apology is an act of negative politeness in Brown and Levinson (1987)'s framework. They list apologies as one of FTAs that directly damage Speaker's positive face and formally define apology as "S indicates that he regrets doing a prior FTA, thereby damaging his own face to some degree –especially if the apology is at the same time a confession with H learning about the transgression through it, and the FTA thus conveys bad news" (p.68).

According to Brown and Levinson (1987), 10 strategies of negative politeness exist. Those are:

- 1) Be conventionally indirect,
- 2) Question, hedge,
- 3) Be pessimistic,
- 4) Minimize the imposition,
- 5) Give deference,
- 6) Apologize,
- 7) Impersonalize Speaker and Hearer,
- 8) State the FTA as a general rule,
- 9) Nominalize, and
- 10) Go on record as incurring a debt, or as not indebting Hearer.

Among these 10 strategies, Brown and Levinson (1987) list 4 ways of apologizing:

- 1) Admit the impingement,
- 2) Indicate reluctance,
- 3) Give overwhelming reasons,
- 4) Beg forgiveness.

The fourth way is exemplified by "excuse me, but...", "I'm sorry to bother you...", "I hope you'll forgive me if...", "please forgive me if...", "would you forgive me if...", and "I beg your indulgence..."(Brown & Levinson, 1987,

p.189). The apologetic error messages used in this study included the utterance “We apologize”. Therefore, only the fourth way is relevant for this thesis.

In addition to Bharuthram (2003)’s list including four views of politeness, Haugh and Hinze (2003) propose four types of politeness based on their interpretations of politeness data in Chinese, English and Japanese languages.

1) *Compensatory politeness* “involves showing that one does not think bad of someone else in spite of some utterance or behavior that could be interpreted as implying that one thinks bad of them” (Haugh & Hinze, 2003, pp.1600-1601). It is worth noting that the cases provided for compensatory politeness involve apologies. A teacher asks a student to do something, but s/he has a reason not to do so and s/he excuses; she is not meant to be disrespectful for the teacher.

2) *Statis politeness* “arises when “what A shows A thinks of B” is consistent with both “what A should show A thinks of B” and “what B thinks A thinks of B”. In this situation, A’s behavior only serves to reinforce B’s perception of A’s evaluation of him or her” (Haugh & Hinze, 2003, p.1604).

3) *Enhancement politeness* “arises from a positive disequilibrium between the addressee’s previous perception of how the speaker evaluates him or her and the evaluation of the addressee shown by the speaker. It differs from compensatory politeness because there is no apparent or potential negative disequilibrium, while it differs from stasis politeness because it involves a positive disequilibrium” (Haugh & Hinze, 2003, p.1605).

4) *Demeanour politeness* “involves showing that one does not think good of oneself, notably in cases where one has received a positive evaluation from someone else. It thus contrasts with the previous three types of politeness, which involve showing what one thinks of others” (Haugh & Hinze, 2003, p. 1606).

The error message in HCI design in this study corresponds to the first type of politeness, that is compensatory politeness in the sense that the computer responds in a way to alleviate possible distress due to the error in the design and thus it is not coincidence that the feedback message is mainly apologetic.

To summarize, in this section, Bharuthram' list of four views of politeness were presented first followed by Leech's politeness principles and Brown and Levinson's face-saving view. The review especially concentrated on Brown and Levinson (1987)'s face-saving view that is based on certain central concepts: model person, face and FTAs. The strategies to alleviate FTAs were explained and the emphasis is especially given to negative politeness strategies since apologies are one of them in Brown and Levinson's theory. Brown and Levinson (1987) list four ways of apologizing. Similarly, in order to investigate the possible ways of apologizing for certain situations, a number of scholars have developed different apology classification systems utilized in various languages. In the following sub-section, one of the apology classification systems, developed by Cohen and Olshtain (Olshtain & Cohen, 1983) is presented.

2.4.1 Classification of apologies

Cohen and Olshtain investigated the nature of variability in the degree of directness of the expression of apology cross-culturally. Their study focused on two speech acts (requests and apologies) in eight languages: American English, Australian English, British English, Canadian French, Danish, German, Hebrew, and Russian. Based on this study Cohen and Olshtain proposed an apology taxonomy consisting of five main strategies and many sub-strategies (Blum-Kulka & Olshtain, 1984). The classification proposed by Cohen and Olshtain is the following:

A. Illocutionary⁴ force indicating devices (IFIDs), an explicit expression of apology

(1) An offer of apology

E.g., *I apologize* (in Turkish *Özür dilerim*)

(2) An expression of regret

E.g., *I am sorry* (in Turkish *Üzgünüm*)

(3) A request for forgiveness

E.g., *Forgive me* (in Turkish *Kusura bakma*)

B. An explanation or account

E.g., *The traffic was terrible* (in Turkish *Trafik çok kötüydü*)
The bus was late (in Turkish *Otobüs geç kaldı*)

C. Take on responsibility

(1) Explicit self-blame

E.g., *It is my mistake* (in Turkish *Benim hatam*)

(2) Lack of intent

E.g., *I didn't mean to* (in Turkish *İstemedem oldum*)

(3) Justify hearer

E.g., *You are right to be angry* (in Turkish *Kızmaya hakkın var*)

(4) Expression of embarrassment

E.g., *I feel awful about it* (in Turkish *Kendimi çok kötü hissediyorum*)

(5) Admission of fact but not of responsibility

E.g., *I missed the bus* (in Turkish *Otobüsü kaçırdım*)

⁴ Illocutionary act: The action intended by the speaker.

(6) Refusal to acknowledge guilt

(a) Denial of responsibility

It wasn't my fault (in Turkish *Benim hatam değildi*)

(b) Blame the hearer

It is your own fault (in Turkish *Bu tamamen senin hatan*)

(c) Pretend to be offender

I am the one to be offended (in Turkish *Alınması gereken benim*)

D. Offer of repair

E.g., *I will pay for the damage* (in Turkish *Zararı ben karşılayacağım*)

E. Promise of forbearance

E.g., *This won't happen again* (in Turkish *Bir daha olmayacak*)

While two of these apology strategies are general, the other three strategies are situation specific (Olshtain, 1989). The two general strategies are: IFID (an explicit expression of an apology) and the expression of speaker's responsibility. It is proposed that these two strategies can be used in all situations and in all languages (Olshtain, 1989). IFIDs are "formulaic, routinized expressions in which the speaker's apology is made explicit" (Blum-Kulka, House & Kasper, 1989, p. 290). This strategy has three sub-strategies. These sub-strategies are *Offer of apology* (e.g., *I apologize*), *An expression of regret* (e.g., *I am sorry*) and *Request for forgiveness* (e.g., *Forgive me*).

The second general strategy is *Take on responsibility*, accepting the responsibility of an act, which is utilized to placate the hearer. There are six sub-classes under this strategy. The main difference between the first five sub-strategies and the last sub-strategy is that the offender accepts the responsibility

directly or indirectly in the first six sub-strategies but s/he denies any blame in the last one by which the speaker completely refuses the acknowledgement of guilt in one or more of the following ways: *Denial of responsibility* (e.g., *It wasn't my fault*), *Blame the hearer* (e.g., *It is your own fault*) and *Pretend to be offender* (e.g., *I am the one to be offended*).

The first five sub-strategies relate to the situations in which the speaker accepts his or her own responsibility of an act or at least his or her involvement in the offensive act. While the sub- strategy *Explicit self-blame* is employed for the situations in which the speaker explicitly confirm the fact that s/he has been at fault, the sub-strategy *Admission of fact but not of responsibility* is utilized for the situations in which the speaker accepts his or her involvement in the offensive act but avoids from openly accepting responsibility. The sub-strategy *Lack of intend* is preferred by the speaker when his or her offensive action is not intended to hurt the hearer, whereas the sub-strategy *Justify hearer* is used by the speaker when the reason of the hearer's reaction towards the speaker is caused by the speaker's offensive act.

The remaining three strategies (*Explanation or account*, *Offer of repair* and *Promise of forbearance*) are situation specific, which means that their use depends on the context. When the speaker prefers to use the strategy *Explanation or account*, which is an indirect way of apologizing, the speaker describes the situation which caused him or her to perpetrate the offence. The following strategy, *Offer of Repair*, may be chosen by the speaker for situations in which the inconvenience influencing the hearer can be retrieved. The last strategy in Cohen and Olshtain's taxonomy is *Promise of forbearance* which is employed by the speaker in order to ensure the hearer that the action which created the need to apologize will not happen in the future.

In this section, Cohen and Olshtain's apology classification scheme is presented. In the next sub-section, the studies which utilized this classification scheme are presented.

2.4.2 Studies on apologies

In this section four different studies that utilized Cohen and Olshtain's apology classification scheme to gain a deeper understanding of the forms of apologies in languages are presented.

Olshtain (1989)

In Olshtain (1989)'s study, seven situations were presented in the discourse completion questionnaire and the responses in Hebrew Language provided by 173 participants were analyzed. The findings of the study showed that the participants preferred to use IFID and the expression of responsibility in all situations. When the percentages of preference for employing these two strategies are investigated, it is realized that there was a considerable variation in the level of preference in relation to the situations. The percentages of IFID ranged from 81% to 38%. On the other hand, the percentages of expression of responsibility ranged from 96% to 32%. The other three situations were utilized in some of the situations. Olshtain (1989) examined the percentages of strategy selection without considering situations in three different languages, Hebrew, Canadian French, and Australian English, and it was revealed that respondents from the three different languages employed IFIDs between 60% and 75%, whereas they used expression of responsibilities between 65% and 70%. This finding showed that these two strategies are highly used in three languages. However, the other three strategies have much lower use compared to IFID and expression of responsibility.

Vollmer and Olshtain (1989)

Vollmer and Olshtain (1989) used the discourse completion test, which is the same with that of Olshtain (1989), in which the apology preferences in German language are investigated. The findings showed that participants utilized IFID and the expression of responsibility in all situations: The use of IFID ranged

from 84% to 37,5%. On the other hand, the use of the expression of responsibility was between 94% and 30%. When the situations are ignored and the total number of possibilities is considered, it is revealed that the respondents used IFID and the expression of responsibility much more than the other three strategies.

Hatipoğlu (2003)

Hatipoğlu (2003) investigated the apology strategies utilized by British and Turkish people. The findings of the study revealed that half of the collected apologies were explained by IFID and expression of responsibility in both Turkish and British culture. The percentages of the strategies for each culture are as follows: IFID (33% for British and 24% for Turkish), An explanation or account (10% for British and 9% for Turkish), Take on responsibility (17% for British and 26% for Turkish), Offer of repair (24% for British and 22% for Turkish) and Promise of forbearance (1% for British and 1% for Turkish).

Afghari (in press)

Afghari (in press) aimed to understand the form of apology in Persian. Findings of the study revealed that 83% of participants utilized IFID which means that most of the Persian participants apologized directly, whereas 6.6% of them employed expression of responsibility. The percentages of the remaining strategies are 6.8% for explanation or account, 2.7% for offer of repair, and 0,1% for promise of forbearance.

Based on the findings of the studies mentioned above, it can be stated that Olshtain (1989), Vollmer and Olshtain (1989) and Hatipoğlu (2003) confirm Cohen and Olshtain's idea that IFID and expression of responsibility are used in all situations, whereas the other three strategies are situation specific. Afghari (in press) confirms Cohen and Olshtain's idea partially since in his study the

percentage of IFID was 83%, while the percentage of the expression of apology was 6.6%.

The studies mentioned above concentrated on the form and type of apologies used in HHI. With the advances in technology, new mediums of communication have started to replace the more traditional forms of communication. This process stimulates experts to argue whether the rules of interaction suitable for HHI are valid for HCI. In attempt to contribute to this discussion, Hatipoğlu (2004) conducted a research investigating the form and type of apologies used in e-mail messages. Hatipoğlu (2004) found that e-mail apologies have some distinctive properties that distinguish them from those utilized in spoken and written languages. This finding reveals that apologies preferred in HHI might be different from those in the other mediums of HCI. Therefore, the researches examining the form and type of apologies in HCI are very important in order to provide a meaningful contribution to the studies which aim to develop human-like computer interface. In the following section, the definition of human-like computer interface and the studies investigating the effectiveness of this kind of interface on users are presented.

2.5 Human-Like Interfaces

Human-like interface is a kind of interactive computer system which has certain characteristics like human beings. Based on the idea that human emotional expressions are important in interpersonal communication, interactive computer systems have been built in order to respond to users who experience frustration and other negative emotions with emotionally supportive interactions. In the relevant literature, the appropriateness of reflecting human characteristics via the computer interface has been discussed among designers and researchers. On the one hand, Shneiderman (1998) is an opponent of making computers provide

anthropomorphic⁵ messages while interacting with the users due to the point that an anthropomorphic message may lead to anxiety for some people. Kling and Star (1998) states that certain human characteristics should not be adapted into machines (e.g., fairness) and designers should be aware of the limits of machines because machinery is not meant to replace humans.

On the other hand, many studies have shown that people can apply social rules regulating human-human interaction into human-computer interaction. For example, Fogg and Nass (1997) showed that users who received flattery from a computer viewed the interaction more enjoyable than those who received plain computer feedback. Fogg and Nass (1997) also showed that users that received flattery from the computer had much greater interest for continuing working with the computer than those who received plain computer feedback. In addition, Klein, Moon and Picard (1999) reached the same results as Fogg and Nass's study.

One of the important views which shapes the human-like interfaces is the *media equation* which means that 'media equals to real life'. Media equation research concentrates on social rules and norms such as politeness, reciprocity, flattery, assignment of roles, praise and criticism (Reeves & Nass, 1996). Nass, Steuer and Tauber (1994) showed that people's interactions with computers are social and this is not the result of a conscious belief that computers are human-like. In other words users treat computers as if they were human during their interaction with computers, though they know that computers have no human motivations such as feelings. Nass and Moon (2000) showed that people tend to rely on social categories and mindlessly apply social rules into computers. Resnik and Lammers (1985) indicated that high self-esteem subjects who received human-like error messages (e.g., 'I don't understand these letters') performed significantly better on computerized tasks than high self-esteem subjects who received less personal, computer-like feedback. These studies support the idea

⁵ In Collins Cobuild English Language Dictionary, 'anthropomorphism' is defined as "the idea that an animal, a god or an object has feelings or characteristics like those of a human being" (p.63).

that emotion-support agents increase users' willingness to continue working with agent.

Nass, Steuer and Tauber (1994) state that people tend to treat computers as social actors and he named this as CASA paradigm: "Computers Are Social Actors". CASA studies demonstrate that the social rules and dynamics guiding human-human interaction are applied equally well to human-computer interaction. Many studies have confirmed the tendency of viewing computers as social actors. Picard (2000) demonstrated that participants who interacted with the emotion-support agent played the game significantly longer than those who interacted with similar agents that ignored their emotions, while Johnson, Gardner and Wiles (2004) indicated that the high computer-literate participants who received feedback including flattery from the computer tended to treat the computer in a manner appropriate to people's reactions to flattery from others.

Moon and Nass (1998) examined how people make attributions of responsibility when interacting with computers by concentrating on 'self-serving bias' in attribution theory which corresponds to the tendency of people to attribute their successes to internal factors and their failures to external factors (Fletcher and Ward, 1988). Moon and Nass (1998) considered the 'similarity' variable which is one of the variables influencing the self-serving bias. The perceived similarity between two people causes them to make more generous attributions regardless of the outcome, which means that they not only attribute the success to each other but they also take more responsibility for failed outcomes. Moon and Nass (1998) investigated the effect of the computerized environment in which users perceive themselves to be similar to the computer compared to the computerized environment in which users perceive themselves to be dissimilar to the computer. The findings showed that the participants working with the similar computer (an example of human-like interface) were more likely to attribute the failure to themselves, compared to those working with the dissimilar computer, and the participants working with the similar computer were more likely to

attribute the success to the computer, compared to those working with the dissimilar computer.

User frustration with information and computing technology is a pervasive problem caused by the factors such as crashing of computers and poor user interfaces (Lazar et al., 2005). Lazar et al. (2005) investigated whether there were commonalities between student and workplace user frustration during their interaction with computers. The study showed that there are three important factors which influence the frustration levels: the time lost, time to fix, and importance of the task. In addition, the study also indicated that these three factors were relevant for both students and work place users. This means that both the frustration level of student and of work place user will be higher if they waste larger amount of time while dealing with the task with higher importance. Another important finding of the study was that when the participants were asked to write down the specific causes of frustration, the most cited cause was the way computer error messages was presented.

Many studies were conducted to find a way to relieve users' negative emotional states (e.g., frustration, confusion, and anger) caused by a computer application with the aim of improving human-computer interaction. Klein, Moon and Picard (2002) investigated whether an interactive affect-support agent supports users to recover from their negative emotional states. The agent, which was a text-based agent, used 'active listening (e.g. "Hmmm. It sounds like you felt really frustrated playing this game. Is that about right?"), empathy (e.g., "Sorry to hear things didn't go so well"), and sympathy statements (e.g., "It sounds like you didn't have the best experience, then. That's not much fun"). The researchers' prediction was that alleviating the users' frustration makes users feel more positive towards the task and therefore continue to interact with it for longer. The findings of the study showed that users interacted with the system significantly longer after interacting with the affect-support agent, compared to the two controls. Similarly, Hone (2006) indicated that text-based agents can be effective in reducing user frustration. In addition to this finding, Hone examined the effect

of embodied agents, and the results of this investigation revealed that the embodied agents providing emotional feedbacks can be more affective at reducing the users' frustration caused by the computer than text-based agents. Brave, Nass and Hutchinson (2005) investigated whether an embodied agent showing empathy has an influence on users. The results indicated that users found an emphatic agent more caring, more likable, more trustworthy and more submissive than agents lacking emphatic emotion.

On the other hand, De Laere, Lundgren and Howe (1998) compares human-like versus machine-like interactional styles of computer interfaces in an empirical study. They did not observe a significant difference between them in terms of self-appraisals and reflected appraisals which pertain to "participants' perceptions of the computer's evaluations of their performance and ability" (De Laere, Lundgren and Howe, 1998, p.44). The findings of the study also showed that whether the feedback is negative or positive differentially affects self-perceptions of the participants. As stated above, no difference between human-like versus machine-like feedback style was observed and this result is explained by the possibility that the fact that the messages were verbal rather than multimodal would be influential in finding no difference. Another reason for this result was explained to pertain to the power of the manipulation between humanness and machineness of the feedback. Manipulation checks show that humanness and machineness of the feedback were not perceived to be significantly different by the participants.

Nielsen (1998) argues that error messages responding to user's action should include a simple apologetic statement when the reason of the error is the limitation of the interface to perform the intended task. Tzeng (2004) examining whether apologetic feedbacks affected users' performance perception showed that subjects in apologetic feedback groups did not perceive their performance and ability to play the game as better than those in non-apologetic groups. This study also indicated that users may not expect computers to be polite, but apologetic statements made subjects feel better about the interaction of the

program. Based on the idea that participants' politeness orientations might influence their perceptions of apologetic error messages presented by the computer, Tzeng (2006) conducted another study investigating users' perceptions of online systems containing three different error messages, each of which includes different politeness strategies. In the study, firstly, users' politeness orientations were elicited and then they were asked to interact with websites including pre-determined problems. When users encountered problems, the system provided certain error messages representing one positive politeness strategy (i.e. joke), one negative politeness strategy (i.e. a simple apology), and a mechanical message for the error (i.e. the page is temporarily unavailable). The findings of the study showed that users who deal with social events with polite expressions preferred to receive apologetic messages significantly more than mechanical or joke messages and they preferred apologetic messages significantly more than those who are less oriented to polite expressions.

2.6 Summary of Chapter 2

In section 2.1 the theoretical links between HCI and Cognitive Science were presented. Then, the emotions from the perspective of Cognitive Science and HCI were elaborated.

In section 2.2 and 2.3 the relationship between cognition and emotion were investigated in relation with attribution theories. The role of cognition and emotions were examined by concentrating on the effect of appraisal processes on emotions. It was stated that the interpretation of performance in a task leads to outcome dependent emotions which are classified as failure-dependent emotions (displeased and unhappy) and success-dependent emotions (satisfaction and happiness). Then, the role of attribution processes in emotions by focusing on the dimensions of attribution (e.g., internal/external and stable/variable). After concentrating on the effect of appraisal and attribution processes on emotions, expressing apologies was presented as a way to alleviate the emotions having occurred after those processes.

In section 2.4 the relevant proposals in politeness research and the relevance of politeness with this thesis were briefly reviewed: Leech (1983)'s politeness principles, Brown and Levinson (1987)'s face saving view, and types of politeness proposed by Haugh and Hinze (2003) were presented as related with this thesis. The apology classification system which was proposed by Olshtain and Cohen (1983) and used in this thesis was introduced. After this introduction, the studies conducted based on this classification system were presented.

In section 2.5 the use of anthropomorphic messages in computer interfaces and the studies considering the use of polite expressions in computer interfaces, which are mostly utilized in HHI, were presented.

2.6 Purpose of the Study

The use of apologies is very crucial for alleviating individuals' failure-dependent emotions. The change in the level of emotions might influence cognitive processes because the relation between cognition and emotion is a two-way causal relation. Therefore, it can be expected that the use of apologetic expressions might influence individuals' cognitive processes. Similarly, the use of apologies in HCI context is very important for mitigating computer users' failure dependent emotions caused by the computer's inability to carry out a task. It can also be stated that the use of apologetic error messages might influence users' self-appraisals of performances. In this sense, self-appraisal of performance is considered as a type of cognitive process.

In this thesis, the effect of apologetic error messages on users' self-appraisals of performances is investigated in relation with their mood states. Stated differently, the interaction effect of apologetic messages and mood states on self-appraisal of performance is also examined.

In the next chapter the methodology of this thesis is presented.

CHAPTER 3

METHOD & RESULTS

3.1 General Overview

This study consists of three phases (see Figure 3. 1). The first phase of this study (see Table 3.1 for progress of the first phase) was conducted in order to reveal which kinds of apology strategy sequences (APSSs) are preferred by users during the interaction with the computer. Among the APSSs elicited in the first phase, two APSSs were selected for producing two apology messages which were intended to utilize in the second phase. The second phase was conducted in order to understand whether these messages were perceived as apologies. After understanding that these messages were perceived as apologies, it was determined that these messages could be used in the third phase. The third phase (see Table 3.2 for progress of the third phase) was conducted in order to find an answer to the following question: Do the apologetic error messages influence users' self-appraisals of performances and their actual performances in the computerized environment?

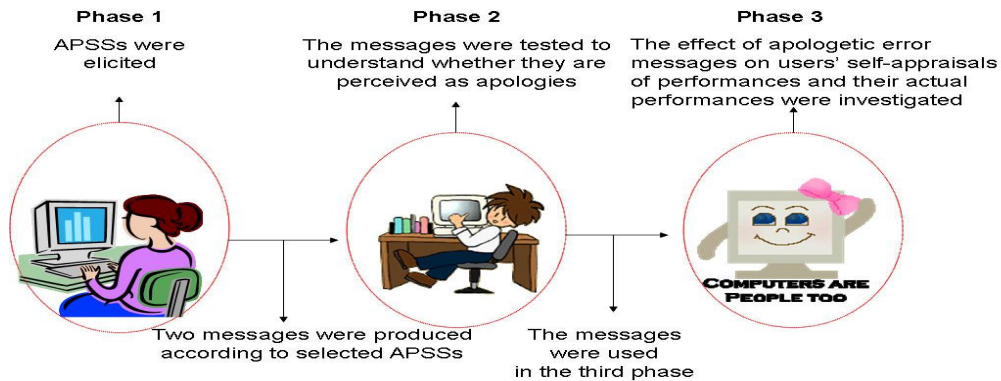


Figure 3. 1 Three phases of the study

Table 3.1 The progress of the first phase

September,2005-October,2005	Online environment was developed
November,2005	The usability testing of the environment was made with 10 participants. The system was revised according to the results of the usability testing
December,2005	Pilot study was conducted with 30 participants. Based on the results of the pilot study last revisions were made
March,2006	Actual study was conducted with 86 participants
April, 2006	The preferred apology formulas were elicited according to the results of the actual study.

Table 3.2 The progress of the third phase

June,2006-September,2006	Development of the system for the third phase
October,2006	Pilot study was conducted with 30 participants and last revisions were made according to the results of the pilot study.
November,2006-December,2006	Actual study was conducted with 220 participants
January, 2007- February 2007	Data analyses

3.2 Phase I

3.2.1 Research Question

1. Which apology strategy sequences (APSSs) are preferred by users during their interaction with the computer?

3.2.2. Participants

86 university students from Baskent University, 43 male and 43 female, aged 20 to 24 years, participated in the first phase of the study. All participants were chosen among the students who had taken the course, “Educational Technology and Material Development”. Of all participants, 16 were from Foreign Language Education, 15 were from Elementary Science Education, 18 were from Elementary Mathematics Education, 17 were from Early Childhood Education, and 20 were from Computer Education and Instructional Technology.

3.2.3 Materials

3.2.3.1 Online Instructional Material

In order to simulate a human-computer interaction environment in which a problem occurs because of the computer’s inability to carry out a task, Macromedia Flash based e-learning environment was developed. The environment consisted of two parts. The first part was the lesson part (see Figure 3.2) and the second one was the test part (see Figure 3.3). The system firstly presented the lesson. In the lesson part, brief information about e-learning material was presented. The topic was related with educational technology and all participants had taken a related course before. Therefore, recalling the topic

was easy for the participants of the first phase. After the lesson, the system activated the test part including seven questions about the topic presented in the lesson part. The material had a deliberate design problem (see Section 3.2.4 for details).

	Davranışçı Yaklaşım	Bilişsel Yaklaşım	Yapılandırmacı Yaklaşım
Öğrenme	Bir davranışın gösterilme olasılığındaki değişim	Bellekte depolanan bilgide meydana gelen değişim	Yaşantılar sonucu, anlamda meydana gelen değişim
Öğrenme Süreci	Etki-tepki-davranış	Dikkat-kodlama-bellekten geri çağırma	Grup etkinlikleri ve katılımcı problem çözme
Öğretmenin Rolü	Dış etkenlerin düzenlenmesi	Bilişsel süreci destekleme	Örnek olma ve rehberlik sağlama

Figure 3.2 Lesson part of the online instructional material

3.2.3.2 Discourse Completion Test

When participants completed the application presented in the online material, there was a need to exploit a second instrument to collect data that was for determining which APSSs the participants preferred during their interaction with the computer. In order to collect the data, an open-ended discourse completion test was designed.

The Discourse Completion Test (DCT) used in the first phase of this study was different from the DCTs employed in previous studies in the sense that the test did not include the scenarios related to the problem situation in which offering an

apology was required. In the DCT, the problem which participants had encountered during the interaction with the computer was recalled. The DCT also included a short description of the problem situation (See Appendix A). Then, participants were asked to write which kind of apology message they would prefer if they encountered the same problem again in a computerized environment. The reason to use this kind of strategy in the development of the DCT is that simulating the problem occurring in a computerized environment is more realistic than writing a scenario which explains the problem. Therefore, simulating the problem occurring in the computerized environment was preferred rather than writing down scenarios related to the problems caused by computers' inability.

EĞİTİM TEKNOLOJİSİ ve MATERYAL GELİŞTİRME

⇒ Aşağıdaki soruları lütfen dikkatlice okuyunuz!
⇒ Bu testten alacağınız puan, dersteki genel başarıınızı etkileyecektir.

Adı-Soyadı: Mahir AKGÜN Numarası : 1152578

2- Bilişsel bakışa göre "öğrenme süreci"ni en iyi açıklayan tanım aşağıdakilerden hangisidir?

a) ● Etki-tepki-davranış
b) ● Tekrarlanan grup diyalogları
c) ● Dikkat-kodlama-bellekten geri çağırma
d) ● Grup içi etkinlikleri düzenleme
e) ● Katılımcı problem çözme

Sonraki soru Soru No: 2

Figure 3. 3 Test part of the online instructional material

3.2.4 Procedure

For the first phase, the interface was designed such that the users encountered an important problem caused by the computer's inability to carry out a task. At the

beginning of the first phase, the aim of the study was not mentioned in order not to affect the participants' natural behavior patterns. Participants did not know that they would encounter a problem while interacting with the computer interface. They first completed the lesson part of the online environment, and then they took the test. After the 2nd question, they encountered a problem. Then, the users received an error message simply saying that there was a problem in the system. The problem was that Turkish alphabetical characters (i.e. ç, ş) were not read properly (see Figure 3.4). The problem was not fixed but the system allowed the users to continue their interaction with the computer. At the end of the interaction, the DCT was distributed to the participants. In the DCT, participants were asked how exactly they would expect the system to inform them about the error.

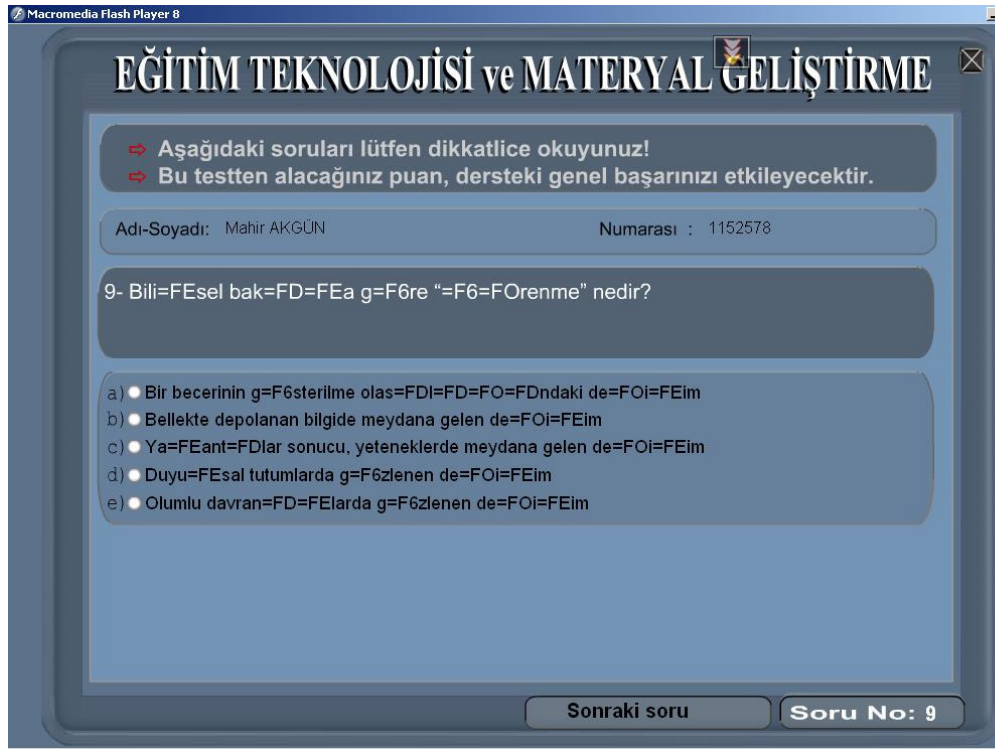


Figure 3.4 The test part of the online instructional material after the problem

3.2.5 Sample answers obtained from the first phase of this study

In order to provide better understanding about participants' responses to the DCT, the sample answers obtained from the first phase are as follows:

- Az sonra sistem hatası düzeltilecektir. Soruları tekrar cevaplama hakkı yeniden kazanılacaktır.
After a short while the system error is going to be fixed. You're going to have new right to answer questions.
- Bu hata yaptığınız işlemleri kapsamına almadı ve yaptıklarınız kayıt olunmadı. Özür dileriz.
Your last actions were not recognized and recorded because of this error. We're sorry.
- Üzgünüm, yanlış yazı karakteriyle karşılaştınız. Sistemde karşılaştığımız sıkıntılar değerlendirmede dikkate alınacaktır.
I'm sorry; you came across the wrong encoding characters. The problems you had during usage of the system are going to be considered in the assessment.
- Üzgünüm, veritabanımızdaki eksiklik ve hatalar nedeniyle teste devam edemiyoruz. Giriş kısmında verdiğiniz bilgiden yola çıkarak, sitemizin yapımı tamamlandıktan sonra size tekrar bu testi uygulamanız gereken bir e-mail göndereceğiz. Başarılar.
I'm sorry; we cannot continue the test because of the missed parts and the errors. On the basis of the information you provided at the entrance into the system, after fixation of the system, we'll send an e-mail expressing that you have to retake the test. Have a successful test.

- Maalesef sistemden kaynaklanan nedenlerden dolayı hata oluşmuştur. Bu hatanın bir daha tekrarlanmayacağından emin olabilirsiniz. Çok özür dileriz. *Unfortunately, there have been some errors because of the system. Be sure that these errors will not occur again. We're sorry.*
- Sistemde, tamamen bizden kaynaklanan bir hata meydana gelmiştir. Bu karışıklık için özür diler, bir daha böyle bir hatayla karşılaşmamanız için çalıştığımızı bilmenizi isteriz. *There has been an error completely due to our fault. We're sorry for this inconvenience. Be informed that we're working on fixation of this error not to have it again.*

3.2.6 Analysis of Statements

The statements were analyzed according to the CSSARP (Cross-Cultural Study of Speech Act Realization Patterns) coding manual (Blum-Kulka and Olshtain, 1984). As mentioned before, Olshtain and Cohen (1983) propose five different strategies to perform an apology: (1) Illocutionary force indicating device (IFID), (2) an explanation or account of the cause (Exp)⁶, (3) an expression of the speaker's responsibility for the offence (ToR), (4) an offer of repair (OoR) and (5) a promise of forbearance (PoF). Olshtain and Cohen (1983) state that although just one strategy is sufficient to perform an apology, two or three of these strategies are combined in order to increase the intensity of an apology. In addition to these strategies, apology intensification might be used.

Apology Intensification (INTENS)

It is used to intensify the apology such as, 'I am **very**... sorry', and 'I am **terribly** sorry'.

⁶ These strategies are identified with the context of the cross-cultural study of speech act realization patterns project. Since these are not specifically designed for HCI contexts, especially Exp and ToR strategies can be confused. This issue will be addressed in Discussion Part.

The general procedure for coding apologies was based on a series of independent questions:

1. Does the statement contain an IFID?
2. Does the statement include an expression of responsibility?
3. Does the statement convey an offer of repair?
4. Does the statement comprise an explanation?
5. Does the statement contain a promise of forbearance?

If the answer of any of these questions was positive, then related strategy would be assigned to that question. For example, if we examine the sentence “Maalesef sistemden kaynaklanan nedenlerden dolayı hata oluşmuştur. Bu hatanın bir daha tekrarlanmayacağından emin olabilirsiniz. Çok özür dileriz”. “*Unfortunately, because of the system, there has been an error. Be sure that this error is not going to be repeated again. We’re sorry*”.

Firstly, the questions were asked for this sentence in the following (see Table 3.3).

Table 3. 3 An example for coding apologies

Questions for the sentence:			
	Answers	Sub-sentence	Strategies
“Maalesef sistemden kaynaklanan nedenlerden dolayı hata oluşmuştur. Bu hatanın bir daha tekrarlanmayacağından emin olabilirsiniz. Çok özür dileriz.”			
“Unfortunately, because of the system, there has been an error. Be sure that this error is not going to be repeated again. We’re sorry.”			
1. Does the statement contain an IFID?	Yes	Çok özür dileriz <i>We’re sorry</i>	IFID

Table 3.3 (continued)

2. Does the statement include an expression of responsibility?	Yes	Maalesef sistemden kaynaklanan nedenlerden dolayı hata oluşmuştur.	ToR
3. Does the statement convey an offer of repair?	No	<i>because of the system</i>	
4. Does the statement comprise an explanation?	No		
5. Does the statement contain a promise of forbearance?	Yes	Bu hatanın bir daha tekrarlanmayacağından emin olabilirsiniz. <i>Be sure that this error is not going to be repeated again</i>	PoF

After finding the answers of these questions, the strategies which the sentence includes were gathered to reach the APSS related to the sentence. Finally, the APSS of the sentence is IFID-ToR-PoF. While coding, the order of the strategies are ignored.

All sentences were analyzed according to the procedure mentioned above by two individuals (one from the field of HCI, and the other from the field of Pragmatics) independently. Then, they compared their analyses for each statement. If they found the same APSS for a sentence, then the sequence would be assigned to that statement. If not, they discussed on the sentence to reach a consensus about which APSS was represented the sentence. Then, the sequence on which individuals agreed upon was assigned to that statement. After determining the APSSs for the messages preferred by users, the frequency of each APSS was calculated. Then, in order to quantify the percentage value for each APSS, the frequency value was divided by the number representing the number of individuals participated in the first phase of this study.

A similar procedure was followed for calculating the percentage values of apology strategies. First, how many participants used an apology strategy in their messages was determined in order to find the frequency value for each message. Second, the frequency value was divided by the number showing the number of individuals participated in the first phase.

3.2.7 Results

3.2.7.1 General Results

The results of the first phase showed that 17 APSSs were elicited from the obtained data. The sequences derived from phase 1 are listed in Table 3.4. In order to provide better understanding about the APSSs, the messages produced according to these APSSs are presented in Appendix D.

Table 3.4 The APSSs derived from phase 1.

APSSs	Gender (%)		Total (%)
	Male	Female	
1. IFID-ToR	16,28	23,26	19,77
2. IFID-ToR-OoR	23,26	9,30	16,28
3. ToR-OoR	16,28	6,98	11,63
4. IFID	4,65	13,95	9,30
5. ToR	13,95	4,65	9,30
6. IFID-ToR-EXP	6,98	4,65	5,81
7. IFID-OoR	0,00	11,63	5,81
8. OoR	4,65	4,65	4,65
9. IFID-EXP	2,33	6,98	4,65
10. ToR-EXP-OoR	2,33	4,65	3,49
11. IFID-EXP-OoR	2,33	2,33	2,33
12. IFID-ToR-EXP-OoR	2,33	0,00	1,16
13. ToR-EXP	2,33	0,00	1,16
14. EXP-OoR	0,00	2,33	1,16

Table 3.4 (continued)

15. IFID-INTENS	0,00	2,33	1,16
16. IFID-ToR-PoF	2,33	0,00	1,16
17. IFID-ToR-PoF-INTENS	0,00	2,33	1,16

When responses to the DCT were examined to understand how respondents used each of the main apology categories, it was realized that ToR was the most widely used apology strategy. 70.93 % of the respondents employed this strategy in their responses. The second frequently used strategy was IFID. 68.60 of the respondents utilized this strategy in their responses. The third strategy was OoR employed by 46,51 % of respondents. The remaining strategies, Exp and PoF, were used by the participants with the percentage values, 19,77 % and 2,33 % respectively. In addition, results indicated that 66,10 % of the respondents who used the IFID were also utilized ToR strategy. Similarly, 63,93 % of the participants who prefer to receive ToR were also employed IFID strategy.

3.2.7.2 Apology Strategies and Genders

The results showed that gender had an effect on the preference of apology messages. As can be seen in Table 3.4, percentages of APSSs are different for male and female participants. For example, for the APSS consisting of IFID and ToR strategies, 16,28% of male participants(Ms) preferred to receive the apology message related to this APSS, whereas 23,26 % of female participants(Fs) preferred this kind of apology. This difference, however, was not significant, $t(83) = -.861, p = .392$.

For the second APSS, IFID-ToR-OoR, 23,26 % of male respondents utilized this formula, whereas 9,30 % of female respondents used it in their responses. This difference was not significant, $t(75) = 1,723, p = .89$.

The other APSSs which were preferred by male and female participants differently were IFID (Ms= 4,65 % < Fs= 13,65 %, $p = .76$), ToR (Ms=13,95 % > Fs=4,65 %, $t(64,43) = -1,803$, $p = .53$), and ToR-OoR (Ms=16,28 % > Fs=6,98 %, $t(75,18) = 1,310$, $p = .194$). These differences were not significant. However, the difference between male and female participants was significant for the APSS including IFID and OoR strategies, IFID-OoR (Ms= 0 % < Fs=11,63 %, $t(41) = -2,354$, $p = .023$).

When responses to the DCT were analyzed as to how respondents utilized each of strategy according to gender, it was found that the percentage of ToR apology strategy employed by Ms was much more frequently than that used by Fs (Ms=86,05 % > Fs=55,81 %) and this difference was significant, $t(60) = 4.392$, $p < 0,01$. A similar result was found for IFID strategy, but this difference was not significant, $t(81,43) = -1,605$, $p = .112$. 60, 47 % of Ms preferred to use IFID strategy, whereas 76, 74 % of Fs utilized it in their responses. The percentage of OoR apology strategy used by Ms was 51,16 %, while the percentage of the strategy employed by Fs was 41, 86 %. This difference was not significant for OoR, $t(83) = .761$, $p = .449$.

The results showed that the percentages of Exp apology strategy utilized by both sexes in the study were almost identical (Ms = 18, 60 % < Fs= 20, 93 %). The results also indicated that the percentages of PoF apology strategy utilized by both sexes in the study were identical (Ms = 2, 33 % = Fs= 2, 33 %).

3.2.8 The rationale to choose two APSSs among the APSSs elicited from the first phase of the study.

One of the aims of this study is to understand whether the contents of apologies are crucial for influencing users' self-appraisals of performances and their actual performances. In order to make this point clear, two APSSs including different contents of apologies were selected. In order to determine two APSSs for the second phase, the following criteria were considered.

1. According to Olshtain (1989) IFIDs are direct apologies and they can be used in any situation for every language. Therefore, when APSSs were selected for the second phase, it was considered that the APSSs included the IFID strategy so that participants could easily perceive the messages as apologies.
2. The percentage value of an APSS to be selected does not equal to 1,66 because the value 1,66 means that the frequency of an APSS is 1. In other words, the APSS was preferred only by one participant.
3. It was taken into account that one of two APSSs had a high percentage value and the other APSS had a low percentage value.
4. It was considered that two APSSs were maximally different in terms of strategies they included. In other words, the APSSs did not consist of the same apology strategies except IFID.
5. When criterion 1, criterion 2 and criterion 3 were considered together, it was determined that the following APSSs had a possibility to be selected for the second phase: IFID-ToR (high percentage), IFID-ToR-OoR (high percentage), IFID-Exp (low percentage) and IFID-Exp-OoR (low percentage).
6. When criterion 4 and criterion 5 were considered together, it was determined that two sets of APSSs were reached in order to utilize in the second phase. First set of APSSs included IFID-ToR and IFID-Exp-OoR, while the second set consisted of IFID-ToR-OoR and IFID-Exp.
7. It was decided to employ the second set of APSSs in the second phase of this study.

In this way, the APSS including IFID and Exp apology strategies (IFID-Exp) and the APSS including IFID, ToR and OoR apology strategies (IFID-ToR-OoR)

were selected for the second phase, and the messages produced based these APSSs were very different from each other in terms of their contents.

3.3 Phase 2

It was questionable whether the apologies selected in the first phase were perceived as apologies because what subjects produce as apologies is not necessarily what they observe as apologies. In order to validate the produced apologies, the second phase of this study was conducted.

3.3.1 Research Questions

- Are the messages prepared with respect to the two APSSs chosen in the first phase perceived as apologies?
- Is the plain computer message perceived as apology?

3.3.2 Participants

In total 32 METU students, 17 male and 15 female, aged from 20 to 24 years, participated to the second phase of the study. All participants were chosen among the students who had taken the course, “Educational Technology and Material Development”.

3.3.3 Materials

3.3.2.1 Apology Perception Rating

This rating scale (See Appendix B) was designed to measure whether participants perceive the messages determined in the first phase of the study as

apologies. In the scale, three messages were presented to all participants and for each message they were asked to judge the politeness value of messages in terms of apologies. The messages utilized in this rating scale are listed in Table 3.5.

Table 3.5 APSSs and messages

Message Group	Apology Strategy Sequence	Message
Apology-1	IFID-ToR-OoR	<p>The problem caused by the system could not be fixed. For this reason, we apologize. The negative effects of the problem on your performance will be considered during the evaluation of the test.</p> <p>Sistemden kaynaklanan problemler nedeniyle oluşan hata onarılamamaktadır. Özür dileriz. Oluşan hatanın performansınız üzerindeki olumsuz etkileri, yapılacak değerlendirme sırasında göz önünde bulundurulacaktır.</p>
Apology-2	IFID-EXP	<p>Turkish characters could not be printed appropriately due to an error. That is why, we express our apologies.</p> <p>Soruların görüntülenmeye çalışıldığı sırada meydana gelen bir hata nedeniyle Türkçe karakterler düzgün bir şekilde görüntülenememektedir. Hatadan dolayı özür dileriz.</p>
Control Message	-	<p>The problem could not be fixed.</p> <p>Oluşan hata onarılamadı</p>

3.3.4 Procedure

The procedure of the second phase of this study was the same as that of the first phase with the exception that the questionnaire used in first phase and the rating scale employed in the second phase were different. As mentioned, in the first phase a DCT was used to elicit the apology preferences of the participants, in the second phase apology perception rating was employed.

3.3.5 Analysis

In order to understand whether there is a significant difference between apology messages and the plain computer message, a repeated ANOVA analysis was conducted. In the analysis, three different messages were considered as if they are three different conditions in which the same participants were involved because all participants judged the three messages in terms of whether the messages are apologies or not.

3.3.6 Results

In this phase, participants judged the three different messages in terms of whether they perceived them as apologies. The Kolmogorov-Smirnow test results showed that the data were not normally distributed. Since the number of participants of this phase was greater than thirty ($N > 30$), the violation of the assumption of normal distribution can be ignored (Gravetter & Wallnau, 1996).

The repeated ANOVA results indicated that there is a significant difference among the messages in terms of apology perception, $F(2, 62) = 70,541, p < 0,05$. When we investigate the pairwise comparisons, it is revealed that the two apology messages ($M_{\text{apology 1}} = 4,750$ and $M_{\text{apology 2}} = 4,125$) are significantly different from the plain computer message ($M_{\text{plain}} = 1,594$), whereas there is no significant difference between the apology messages (See Table 3.6).

Table 3.6 Apology message comparisons

	Mean Difference	Std. Error	Sig.
<i>Comparisons</i>			
Apology1 Message- Apology2 Message	0,625	0,276	0,092
Apology1 Message- Plain Message	3,156	0,330	0,000
Apology2 Message- Plain Message	2,531	0,229	0,000

These results indicated that the plain computer message was not perceived as an apology message, whereas the two apology messages were perceived as apologies.

3.4 Phase 3

3.4.1 Research Questions

This study seeks to answer the following research questions.

- Does the use of apologetic error message affect participants' self-appraisals of performances while interacting with computer interface?

Sub questions are:

1. Is there any significant difference between the self-appraisals of performances of the users who received an apologetic message and of those who received a plain message?
2. Is there any significant difference among the participants' self-appraisals of performances in the computerized environment with respect to their mood states?

- Does the use of apologetic feedback affect participants' real-task performances while interacting with computer interface?

Sub questions are:

3. Is there any significant difference between the real-task performances of the users who received an apologetic message and of those who received a plain message?
 4. Is there any significant difference among the participants' real-task performances in the computerized environment with respect to their mood states?
- Is there any relationship between the computer users' self-appraisals of performances and their response time after the transmission of the apologetic error messages?

3.4.2 Participants

220 university students participated in the third phase of the study. 40 students were eliminated. 12 of them were eliminated because of the missing data and 28 of them were ignored because their response time (see Section 3.3.3.2 for details) was out of the confidence interval of response time. Of the remaining 180 students, 105 were female and 75 were male. Participants of the third phase of the study aged 20 to 24 years. All participants were chosen among the students who had taken the course, "Educational Technology and Material Development". Table 3.7 shows the number of participants with respect to their departments.

Table 3.7 The number of participants of the third phase

Department	Number of the participants
Computer Education and Instructional Technology	62
Early Childhood Education	32
Elementary Mathematics Education	36
Elementary Science Education	29
Foreign Language Education	21

3.4.3 Materials

3.4.3.1 Mood Questionnaire

Before starting the application, the mood questionnaire (See Appendix C) was used to measure participants' mood state. It involved 10 adjectives which were the same with those used in Efklides and Petkaki's study (2005). These adjectives were: (I am feeling) well, sad, calm, melancholic, pleased, worried, joyful, excited, pessimist, and disappointed. Efklides and Petkaki revealed that the questionnaire comprised two main factors: one for negative affect (sad, melancholic, anxious, pessimistic, and disappointed) and one for positive affect (good, calm, happy, excited, and pleased). In our study, an explanatory factor analysis was conducted to reveal the underlying factors. Our findings were the same as those of Efklides and Petkaki's study (2005). According to our results, two factors were found, positive and negative affects (For detailed information, see Section 3.4.9.1). Good, calm, happy, excited, and pleased loaded on positive affect. Sad, melancholic, anxious, pessimistic, and disappointed loaded on negative affect. The scoring of the questionnaire was made separately for the negative and positive mood. If participant's positive mood was greater than the negative mood, s/he was considered to be in positive mood. For the reverse situation, s/he was considered to be in negative mood before the task.

3.4.3.2 Online Instructional Material

This material was very similar to the one used in the first phase of this study. Recall that the material consisted of two parts: a lesson part in which the brief information about educational technology and material development was presented, and a test part which included seven questions. One of the differences of the material used in the third phase was that the material included the mood state questionnaire presented before the lesson and included fourteen questions in the test part of the material instead of seven questions. The other difference was that the online environment had a database connection so as to record the collected data into the database. In the online environment, participants' answers to the questions and their responses to the mood questionnaire were retained. In addition, participants' response time was also recorded for two reasons. First, the amount of time spent for each questions by each participants was recorded in order to eliminate the participant whose response time was out of the confidence interval. Second, the response time was utilized as a dependent variable for task performance and self-appraisal of performance. Moreover, in the online environment, individuals were asked to participate in a short lesson. After the lesson, a multiple choice exam related to the topics of the lesson was presented. The material was developed in Macromedia Flash environment.

3.4.3.3 Test Questions

Test questions were utilized in this study because use of test questions increases objectivity and decreases efforts exerted during the evaluation of the participants' responses to the questions in terms of answers' correctness. Seven different pairs of questions (in total 14 questions) were prepared by a subject matter expert. For each pair, questions were based on the same educational objective and they were approximately at the same difficulty level. Then the questions of each pair were separated in order to form two sets of questions. In other words, each set has an equivalent question with the one in the other set.

Therefore, each set of questions measured participants' performances on the same topics with similar difficulty levels. After preparing the sets, questions were checked by two other subject matter experts in terms of questions' difficulty level, intended educational objectives, and correctness of the questions. Based on these experts' suggestions, related corrections were made and the questions were ready to utilize in the study.

3.4.4 Experimental Design

In the study, there were two experiment groups and one control group (see Figure 3. 5). Experiment groups were apology-1 group and apology-2 group. Participants in apology groups received error messages including apologetic statements. But participants in each apology group received a different apology message. On the other hand, participants in the control group received a plain computer message. Participants were randomly assigned to the groups by the system. The outcome of the random assignment is listed in Table 3.8.

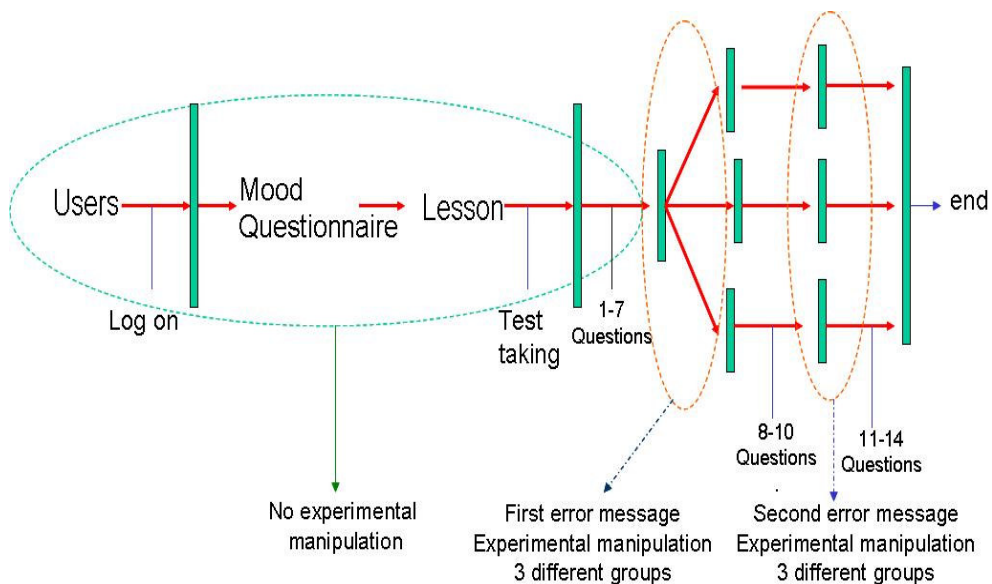


Figure 3. 5 Diagram including experimental design of the third phase

Table 3.8 Random assignments of participants

	Apology-1 Group	Apology-2 Group	Control Group
<i>Gender</i>			
Female	40	36	29
Male	26	21	28
<i>Mood State</i>			
Positive Affect	41	34	28
Negative Affect	25	23	29
Total	66	57	57

3.4.5 Procedure

In the third phase of the study, a web environment was used. After the log-on procedure, the questionnaire about the mood state was presented (see Figure 3.6). Once filling the questionnaire, the system presented a short lesson about educational technologies (see Figure 3.7). When participants completed the short lesson, they took the exam related to the short lesson. The participants were instructed to answer each question by choosing one of the five answer alternatives, one of which was always correct (see Figure 3.8). After each question, the participant made a confidence rating of how sure s/he was that they had answered the question correctly (see Figure 3.9). The scale on which participants made confidence rating ranged from 0 to 100%. It was explained that 0% meant that s/he was absolutely not sure about the correctness of their answers, and 100% meant that s/he was certainly sure for the correctness of their answers. In the exam, there were 14 different multiple choice questions. Questions were given in a pre-determined order. After each question was answered, it was not allowed to go back to the answered question. When participants completed the 7th question, they encountered a problem caused by the system. The problem was that Turkish alphabetical characters (i.e. ç, ş) were not read properly (see Figure 3.10). Hence, it was very difficult to read the questions and related choices. This problem was designed on purpose. When the problem occurred, the system showed an error message (see Figure 3.11). After the error message, the system informed participants that the problem that

occurred could not be fixed by the system. The error message was changed from group to group. In other words, the system showed a different error message to each group. Here the point was to understand which message made a difference among groups. The problem could not be fixed throughout the following seven questions (8th-14th). Participants were forced to answer the remaining questions in this fashion. After the 10th question, the second message which was the same with the first message for each group was presented in order to understand whether there is a short term or long term effect of the message type on both participants' performance perception and feeling of satisfaction about performance. In other words, in each group, participants received the same error message twice. At the end of the exam, participants were asked whether the content of the error message that they received included an apology statement or not. The procedure was the same for all three groups with the exception stated above, i.e. the error message received by the group members was different for each group.

EĞİTİM TEKNOLOJİSİ ve MATERYAL GELİŞTİRME

Aşağıda belirtilen duygu halleri **bu gün** için size ne kadar uygundur?
Eğer çok uygunsa 5'i, hiç uygun değilse 1'i seçiniz.
Her duygu hali için size en uygun olan rakamı seçiniz.

Mutlu : Hiç ● 1 ● 2 ● 3 ● 4 ● 5 ● Çok
Çökkün : Hiç ● 1 ● 2 ● 3 ● 4 ● 5 ● Çok
Karamsar : Hiç ● 1 ● 2 ● 3 ● 4 ● 5 ● Çok

1 Devam

Figure 3.6 One of the screens in which mood state questionnaire was presented.

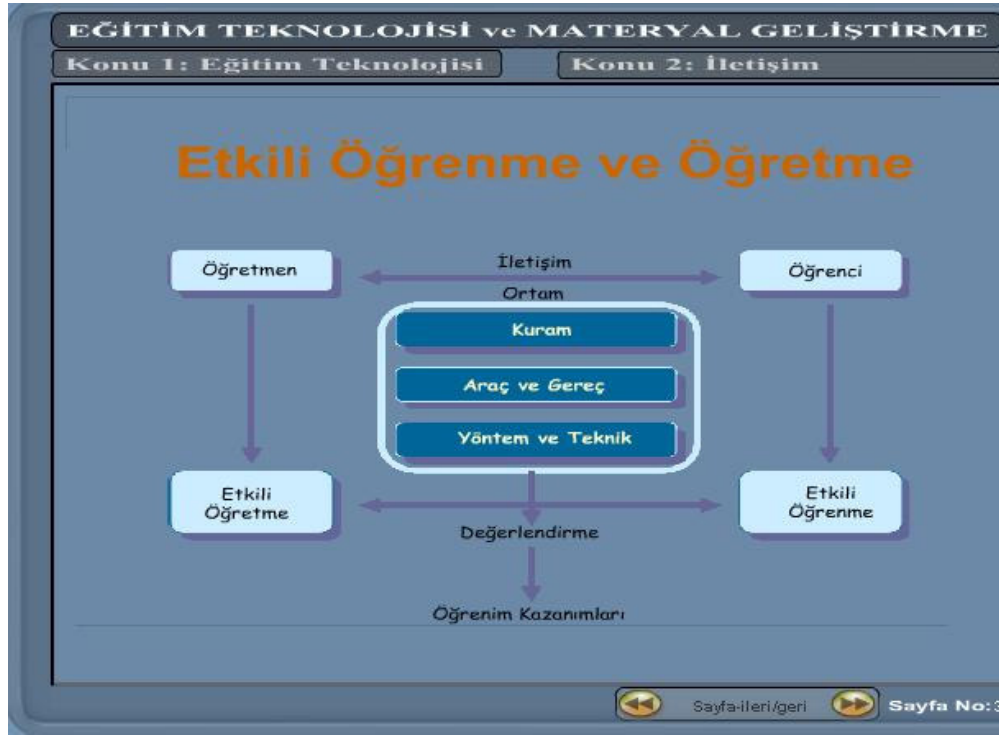


Figure 3.7 An example of screens related to the short lesson

EĞİTİM TEKNOLOJİSİ ve MATERYAL GELİŞTİRME

⇒ Aşağıdaki soruları lütfen dikkatlice okuyunuz!
 ⇒ Bu testten alacağınız puan, dersteki genel başarınızı etkileyecektir.

Adı-Soyadı: Mahir AKGÜN Numarası : 1152578

3- Oluşturmacı bakışa göre "öğretmenin rolü" aşağıdakilerden hangisidir?

a) ● Yeni bilgiyi mevcut bilgiyle ilişkilendirme
 b) ● Bilişsel süreci destekleyen koşulları düzenleme
 c) ● Bilgiyi aktarmak için farklı yöntemler kullanma
 d) ● Doğal öğrenme ortamı içerisinde rehberlik etme
 e) ● Görsel materyal kullanarak öğretimi zenginleştirme

Sonraki soru Soru No: 3

Figure 3.8 Screen related to the third question

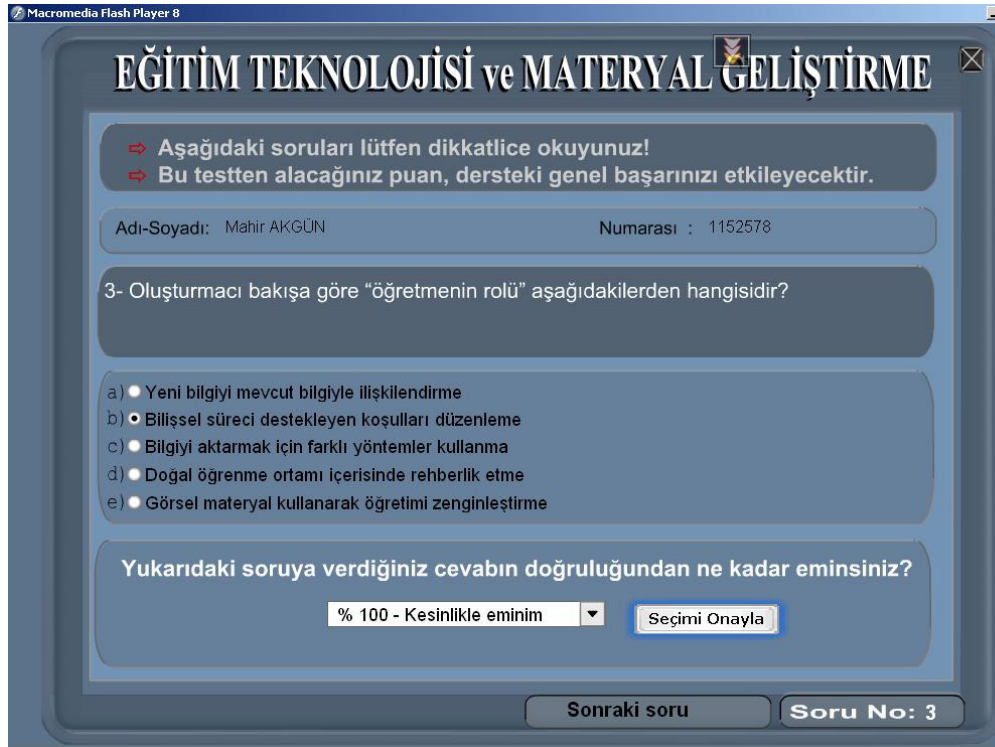


Figure 3.9 Screen related to confidence rating part of the third question

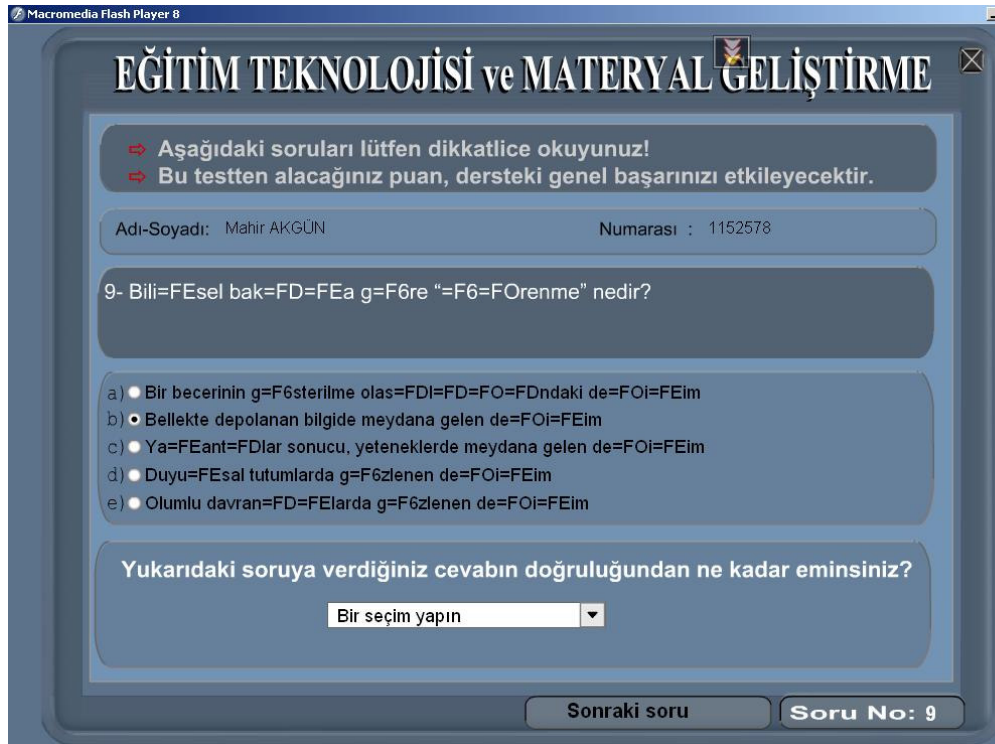


Figure 3.10 Screen related to the problem situation

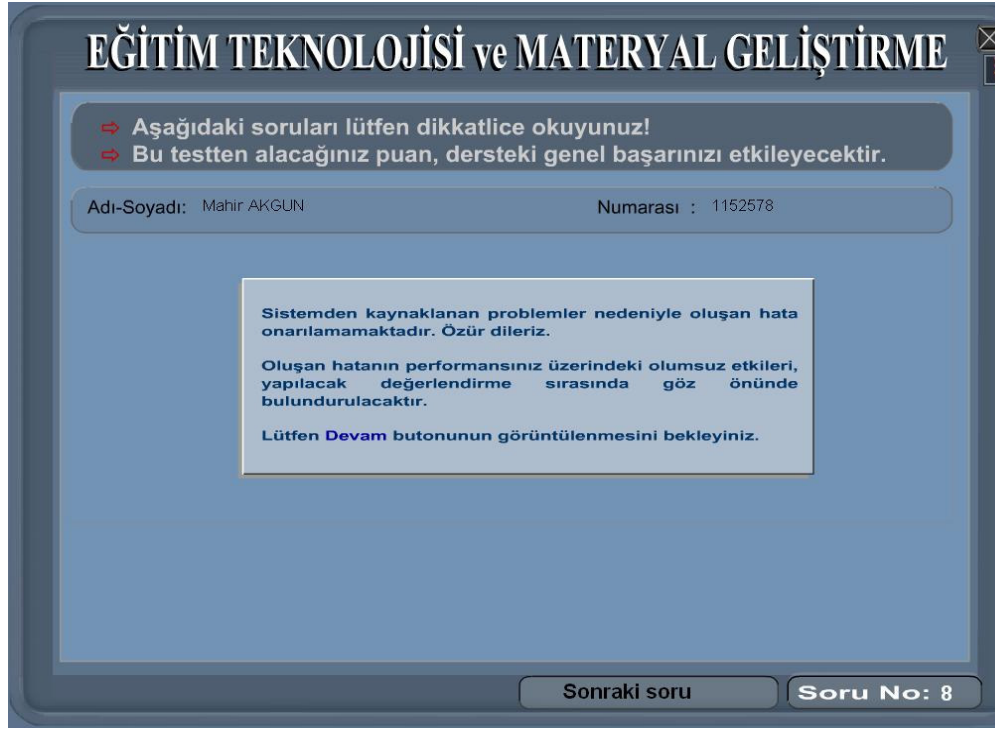


Figure 3.11 One of the error messages used in the third phase

3.4.6 Analysis

A mixed ANOVA was conducted to evaluate the relationship between message type and self-appraisal of performance and between message type and actual performance. In the analysis, message types and gender were considered as between subject variables. As stated before, there were two experimental groups in which different apologetic error messages were utilized and one control group in which a plain computer message was employed. While self-appraisal of performance and actual performance were considered as dependent variables, mood state was used as quasi-independent variable in our study. There were three levels of dependent variables. One of the aims of the study was to understand whether there were significant decreases or increases on the different levels of dependent variables according to message types. Namely, the study investigated both within-subject variables and between-subject variables simultaneously. For this reason, a mixed ANOVA was chosen for analyzing the data in this study.

3.4.7 Independent Variables

3.4.7.1 Message Type (Between-Subject Variable)

Recall that we derived seventeen different APSSs in the first phase of the study. Based on these formulas, we prepared two different apology messages (see section 3.2.2.1). These messages were used in experimental groups. In addition to these apology messages, one plain computer message was prepared to utilize in control group (see section 3.2.2.1).

3.4.7.2 Mood State (Between-Subject Variable)

There are four approaches that employ emotions in research: (1) induced emotional states as an independent variable or as a dependent variable (2) remembered and hypothetical emotional states, (3) emotional traits and affective disorders, (4) naturally occurring temporary emotional reactions (Parrott & Hertel, 1999).

In the first one, induced emotional state, participants' moods are tried to change in order to make desired transformation in their mood states. The manipulation of the experiment is made by the method of induced emotional method. Induced emotional state is also employed as a dependent variable if the aim of the research is to discover the causes of emotion or emotional consequences of independent variable (Parrott & Hertel, 1999).

The aim of utilizing the second method is to analyze the participants' conceptions of emotion and their emotion knowledge, rather than their emotions. In this kind of studies, participants are asked to recall previous emotional experiences, past emotional states, their memories of past emotional events, and so on (Parrott & Hertel, 1999).

The third method is to investigate stable emotional traits or affective disorders, rather than temporary one. This kind of research is also called quasi-experimental because stable emotional dispositions or affective disorders are pre-existing before the time at which the experiment is conducted (Parrott & Hertel, 1999).

The fourth way to incorporate emotions in research is “naturally occurring temporary emotional reaction” which means that emotional states are not manipulated before starting the experiment, but rather, the group, experimental and control, are formed based on emotional states obtained in a natural way. These states gathered naturally can serve either as quasi-independent variable or dependent variables (Parrott & Hertel, 1999).

Based on the fourth way, the mood states were used as quasi-independent variable in our study because they were not manipulated before starting the experiment.

3.4.8 Dependent Variables

3.4.8.1 Real-task performance (Within-subject variable)

Participants’ performance was assessed by adding the number of questions correctly answered in each set. In the study, there were three different dependent variables for actual performance:

Performance 1 variable

(Actual performance of the first seven questions, before the first error message).

In order to measure this variable, the number of correct responses was calculated and then the total score was divided by seven to get the mean score.

Performance 2 variable

(Actual performance on the questions from 8 to 10, between the first error message and the second error message).

So as to measure this variable, the number of correct responses of questions between 8 and 10 was calculated and then the total score was divided by three to get the mean score.

Performance 3 variable

(Actual performance on the questions from 11 to 14, between the second error message and the end of the test).

In order to measure this variable, the number of correct responses of questions from 11 to 14 was calculated and then the total score was divided by four to get the mean score.

3.4.8.2 Self-appraisal of performance (Within-subject variable)

This variable was measured to determine whether the apologetic error message affects participants' self-appraisal of performance.

Levels of self-appraisal of performance is generally determined by questions such as "how well do you think you performed on this test?" or "how would you rate your performance?" (De Laere, Lundgren & Howe, 1998). Similarly, in our study, participants were asked to judge their performances for each question by means of a rating scale. The rating scale was used to determine their self-appraisal of performances.

In order to measure the participants' self-appraisal of performance, our procedure was to quantify the self-appraisal of performance for each question and then an overall self-appraisal of performance score was computed for each group of questions by summing up the first seven scores (questions from 1 to 7), scores of questions 8 to 10 and those of questions from 11 to 14 separately. Total scores of participants' self-appraisal of performance were based on their

confidence ratings. Self-appraisal of performance score assigned to each question was simply the participant's confidence ratings for the question regardless of the correctness of the answer for the question. Table 3.9 shows the self-appraisal of performance score for each confidence rating.

Table 3.9 Self-appraisal of performance scores

CRS	SPS
5 → certainly correct	5
4 → probably correct	4
3 → uncertain	3
2 → probably incorrect	2
1 → certainly incorrect	1

CRS: Confidence Rating Score

SPS: Self-appraisal of performance score

Self-appraisal 1 variable

(Self-appraisal of performance score of first seven questions, before the first error message).

Self-appraisal of performance scores of the first seven questions were summed up and then the total score was divided by seven to get the mean score.

Self-appraisal 2 variable

(Self-appraisal of performance scores on the questions from 8 to 10, between the first error message and the second error message).

Self-appraisal of performance scores of the questions from 8 to 10 were summed up and then the total score was divided by three to get the mean score.

Self-appraisal 3 variable

(Self-appraisal of performance scores on the questions from 11 to 14, between the first error message and the second error message).

Self-appraisal of the performance scores for the questions from 11 to 14 were summed up and then the total score was divided by four get mean score.

3.4.8.3 Response time (Within-subject variable)

Participants' response time for each question was recorded by the system. In the study, there were three different dependent variables for response time:

Response time 1 variable

(Total response time for the questions 1 to 7, before the first error message).

In order to measure this variable, participants' response time was recorded for each question and then the total response time was calculated for the questions 1 to 7.

Response time 2 variable

(Total response time for the questions 8 to 10, between the first error message and the second error message).

So as to measure this variable, participants' response time was recorded for each question and then the total response time was calculated for the questions 8 to 10.

Response time 3 variable

(Total response time for the questions 11 to 14, between the second error message and the end of the test).

In order to measure this variable, participants' response time was recorded for each question and then the total response time was calculated for the questions 11 to 14.

3.4.9 Results

There are two main dependent variables and each one has three sub-dependent variables. In order to understand whether they were normally distributed the K-S test was conducted. The results showed that the data were not normally distributed for each dependent variable. In order to normalize the data log transformation was made and the K-S test was conducted on the log-transformed data. The results indicated that the log-transformed data were again not normally distributed. According to Gravetter and Wallnau (1996), if the number of the participants for each between subject group is greater than thirty ($N > 30$), the assumption of normal distribution is assumed to be met. In our study, there are three groups, each of which has more than thirty participants. Therefore, it was accepted that the assumption of normal distribution was met for the study. In the remaining analyses the original data were used. For the analyses all effects are reported as significant at $p < 0, 05$.

3.4.9.1 Exploratory Factor Analysis for the Mood Questionnaire

Exploratory factor analysis was conducted in order to understand how many factors there are in the mood state questionnaire. The KMO index of sampling adequacy was .90 for the sample, indicating that the data represented a homogeneous collection of variables that were suitable for factor analysis. Bartlett's test of sphericity was significant for the sample ($\chi^2(45) = 2267.89$; $p < .001$), indicating that the set of correlations in the correlation matrix was significantly different from zero and suitable for factor analysis.

Following Reise, Waller, and Comrey's (2000) suggestion, a principle component extraction with varimax rotation was run to estimate the number of factors. Prior analysis indicated a two-factor solution, explaining 77.84% of total variance. Eigenvalues and the screeplot offered two-factor solution, too. Furthermore, a conducted parallel analysis (Reise, Waller, & Comrey, 2000)

revealed the same result. These variables were internally consistent and well defined by the variables. The first extracted factor, labeled positive affect, composed of 5 items and explained 42.70% of the variance. Positive affect included positive mood instances such as satisfied, calm, happy, etc. The second factor, termed negative affect, consisted of 5 items and explained 35.14% of the variance. Negative affect referred to negative mood states such as disappointment, depressing, anxious, etc. Table 3.10 indicates item loadings, eigenvalues, and proportion of variance explained. Each factor namely positive and negative affect had satisfactory internal consistency ($\alpha=.96$, and $\alpha=.88$, respectively).

Table 3. 10 Item loadings, communalities, eigenvalues, and proportion of variance explained

	Positive Affect	Negative Affect	Communalities
Hoşnut (<i>Pleased</i>)	,91		,96
Sakin (<i>Calm</i>)	,87		,90
İyi (<i>Good</i>)	,86		,78
Heyecanlı (<i>Excited</i>)	,86		,86
Mutlu (<i>Happy</i>)	,82		,85
Hayal Kırıklığı (<i>Disappointed</i>)		,85	,80
Hüzünlü (<i>Sad</i>)		,81	,72
Endişeli (<i>Anxious</i>)		,73	,72
Üzgün (<i>Melancholic</i>)		,72	,55
Karamsar (<i>Pessimistic</i>)		,69	,63
Eigenvalues	6,58	1,20	
Explained Variance	42,70	35,14	

As the factor analysis of the mood state questionnaire revealed, this device could reliably assess positive as well as negative mood.

3.4.9.2 The participants' self-appraisals of their performance

In the following, main effects, interaction effects, and the contrasts of pairwise comparisons were investigated.

3.4.9.2.1 Main effect of message type on self-appraisal of performance

The mixed ANOVA results showed that the main effect of message type on self-appraisal of performance was significant when repeated measures of three sequenced occasions were considered, $F(4,354) = 2.644, p < .05$. Contrasts revealed that quadratic trend showed significance for three sequenced occasions, $F(2,177) = 4.467, p < .05$. In order to provide better understanding about the repeated measure results, Figure 3.12 is given below.

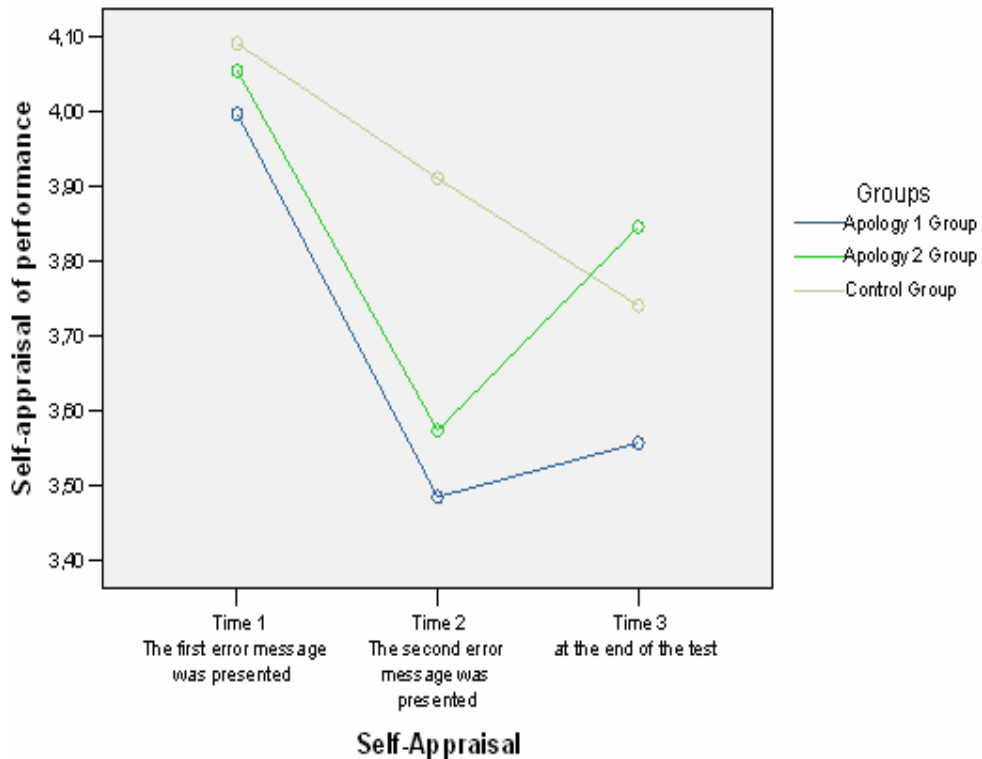


Figure 3.12 Self-appraisal of performance

On the other hand, when the between-subjects effects were investigated, the results did not show significance among groups, $F(2,177) = 1,894, p = .154$. The descriptive statistics of self-appraisal of performance are given in Table 3.11.

Table 3.11 Descriptive statistics of self-appraisal of performance

	Self-appraisal 1 Before 1 st error message		Self-appraisal 2 Between 1 st and 2 nd error message		Self-appraisal 3 After 2 nd error message	
	<u>Mean</u>	<u>S.D</u>	<u>Mean</u>	<u>S.D</u>	<u>Mean</u>	<u>S.D</u>
<i>Message Groups</i>						
Apology 1 Group	4,00	0,66	3,48	1,00	3,56	1,07
Apology 2 Group	4,06	0,56	3,57	0,88	3,85	0,90
Control Group	4,09	0,55	3,91	0,75	3,74	0,93

3.4.9.2.2 Interaction effect of message type and mood state on self-appraisal of performance

The results of the test of within-subjects effects showed that there was a significant interaction effect of message type and mood state on self-appraisal of performance, $F(10, 348) = 3,327, p < .05$. The contrast indicated a significant quadratic trend for the three sequenced occasions, $F(5,174) = 5,826, p < .05$. Moreover, when the results of the test of between-subject effects were investigated, the interaction of message type and mood state revealed the significant effect on self-appraisal of performance between groups, $F(5, 174) = 3,033, p < .05, r = .13$.

This effect explains that the influence of apology messages on self-appraisal of performance depends on participants' mood state. In order to provide better understanding, Table 3.12, which presents descriptive statistics about interaction effect of message type and mood state, Figure 3.13 and Figure 3.14 are given.

Table 3.12 Descriptive statistics about interaction effect of message type and mood state

	Self-appraisal 1 Before 1 st error message		Self-appraisal 2 Between 1 st and 2 nd error message		Self-appraisal 3 After 2 nd error message	
	<u>Mean</u>	<u>S.D</u>	<u>Mean</u>	<u>S.D</u>	<u>Mean</u>	<u>S.D</u>
<i>Message Groups</i>						
Apology 1 Group						
Positive affect	4,00	0,61	3,75	0,86	3,55	1,02
Negative affect	4,00	0,76	3,05	1,08	3,57	1,15
Total	4,00	0,66	3,48	1,00	3,56	1,07
Apology 2 Group						
Positive affect	4,20	0,40	3,70	0,79	4,17	0,70
Negative affect	3,84	0,70	3,38	0,98	3,36	0,95
Total	4,06	0,56	3,57	0,88	3,85	0,90
Control Group						
Positive affect	3,93	0,60	3,76	0,63	3,71	1,03
Negative affect	4,25	0,46	4,05	0,84	3,78	0,82
Total	4,09	0,55	3,91	0,75	3,74	0,93

Figure 3.13 shows that self-appraisal of performance of participants having negative mood in control group decreased without sharp changes between the time 1st error message was presented and the time 2nd error message was presented, and between the time 2nd error message was presented and the time at the end of the test. Similarly, self-appraisal of performance of participants in apology 2 group decreased from time1 to time2 with sharp decline. After the

second apology message, this decline continues but the slope of the decline was less steep than the previous one. In apology 1 group, participants having negative mood did not think that they performed better in stage 2 compared to stage 1 and the slope of this decline was greater than those of other groups. When they received the second apology message, their self-appraisals of performances increased. Finally, at the end of the application, participants' self-appraisals of performance scores were close to each other.

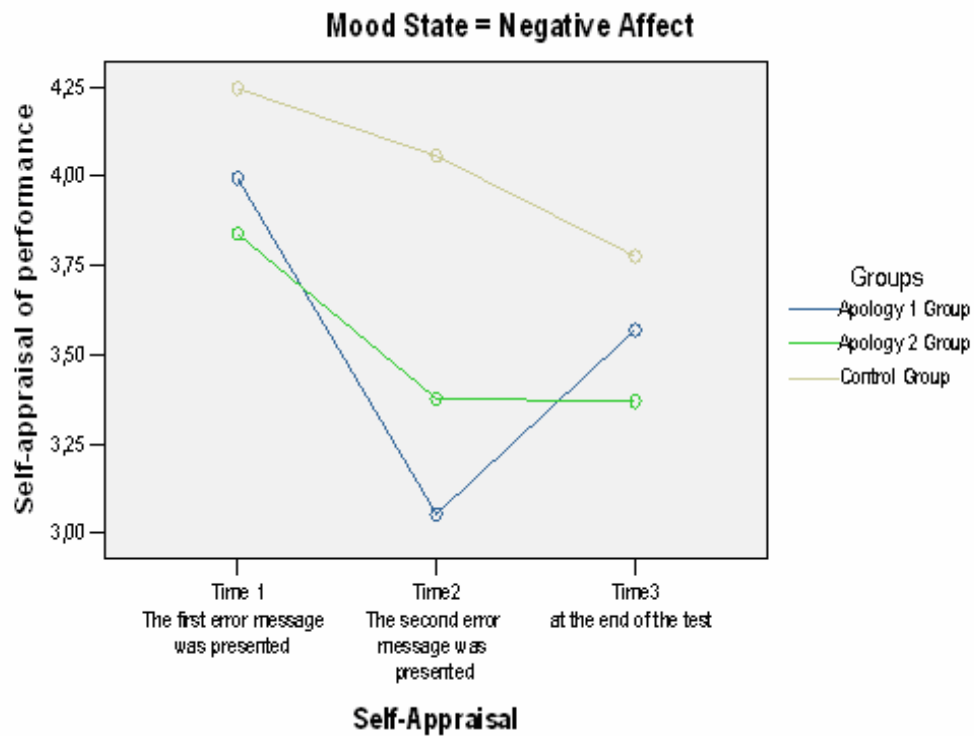


Figure 3.13 Self-appraisal of performance at negative mood

On the other hand, for positive mood, changes among occasions in terms of self-appraisal of performance were different than those of negative mood. Figure 3.14 indicates that participants' self-appraisals of performances decreased in all groups after the problem occurred. When they received the second message,

participants' self-appraisals of performances continued to descend in apology1 and control group. This decline was similar to that of between time1 and time2.

However, after second message, participants' confidence level increased in the apology 2 group. This means that participants in the apology 2 group responded to questions with more confidence after they had received the second apology message.

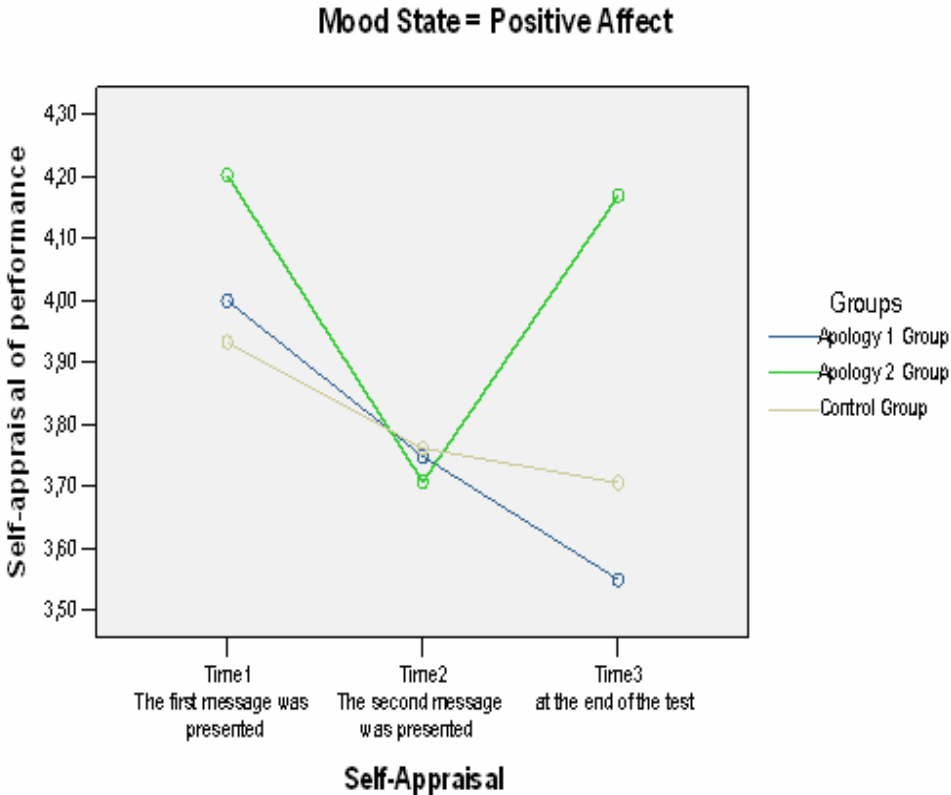


Figure 3. 14 Self-appraisal of performance at positive mood

3.4.9.2.3 Interaction effect of message type and gender on self-appraisal of performance

The results of the test of within-subjects effects showed that there was a significant interaction effect of message type and gender on self-appraisal of

performance, $F(10, 348) = 2,721, p < .05$. The contrast indicated significant quadratic trend for the three sequenced occasions, $F(5, 174) = 3,460, p < .05$. On the other hand, when the between-subject effects were investigated, the mixed ANOVA results revealed that there was no significant effect between groups, $F(5, 174) = 1,919, p = .094$.

3.4.9.2.4 Interaction effect of message type, mood state and gender on self-appraisal of performance

The results of the test of within-subjects effects showed that there was a significant three-way interaction effect of message type, mood state and gender on self-appraisal of performance, $F(22, 336) = 2,633, p < .05$. The contrast revealed a significant quadratic trend for the three sequenced occasions, $F(11, 168) = 4,165, p < .05$. On the other hand, when the between-subject effects were investigated, the mixed ANOVA results indicated that the three way interaction of message type, gender and mood state on self-appraisal of performance was not marginally significant, $F(11, 168) = 1,770, p = .063$.

3.4.9.3 The participants' actual performances

3.4.9.3.1 Main effect of message type on actual performance

Mauchly's test indicated that the assumption of sphericity⁷ had been violated ($X^2(2) = 12,282, p < .05$); therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = .94$). The results of the test of within-subjects effects indicated that there was no significant main effect of message type on actual performance, $F(4, 354) = 1,473, p = .210$. Similarly, the

⁷ "Sphericity refers to the equality of variances of the differences between treatment levels. So, if you were to take each pair of treatment levels, and calculate the differences between each pair of scores, then it is necessary that these differences have equal variances" (Field, 2005, p. 428).

mixed ANOVA results showed that there was no significant difference between groups, $F(2, 177) = .367, p = .693$. Descriptive statistics are given in Table 3.13.

Table 3. 13 Descriptive statistics of actual performance

	Performance 1		Performance 2		Performance 3	
	Before 1 st error message		Between 1 st and 2 nd error message		After 2 nd error message	
	<u>Mean</u>	<u>S.D</u>	<u>Mean</u>	<u>S.D</u>	<u>Mean</u>	<u>S.D</u>
<i>Message Groups</i>						
Apology1 Group	0,62	0,21	0,60	0,28	0,61	0,26
Apology2 Group	0,62	0,19	0,64	0,29	0,58	0,25
Control Group	0,60	0,18	0,64	0,34	0,52	0,27

3.4.9.3.2 Interaction effect of message type and mood state on actual performance

Mauchly's test indicated that the assumption of sphericity had been violated ($X^2(2) = 12,110, p < .05$); therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = .94$). The results of the test of within-subjects effects showed that there was no significant interaction effect of message type and mood state on actual performance, $F(9,37, 325,96) = 1,867, p = .053$. The contrast indicated that there was no significant effect. Moreover, when the between-subject effects were investigated, the mixed ANOVA results revealed that there was no significant interaction effect of message type and mood state on actual performance between groups, $F(5, 174) = 1,500, p = .192$.

3.4.9.3.3 Interaction effect of message type and gender on actual performance

Mauchly's test indicated that the assumption of sphericity had been violated ($X^2(2) = 13,382, p < .05$). Therefore, degrees of freedom were corrected using

Greenhouse-Geisser estimates of sphericity ($\epsilon = .93$). The results of the test of within-subjects effects showed that there was no significant interaction effect of message type and gender on actual performance, $F(9,30, 323,89) = 1,811$, $p = .063$. The contrast denoted that there was a significant linear trend for the three sequenced occasions, $F(5, 174) = 2,498$, $p < .05$. When the between-subject effects were investigated, the mixed ANOVA indicated that there was a significant interaction effect of message type and gender on actual performance between groups, $F(5, 174) = 3,404$, $p < .05$. Since the assumption of homogeneity of variance⁸ had been violated for the occasion between the first error message and the second error message ($p < .05$), the result indicating the significance between experimental and control groups in terms of the interaction effect of message type and gender on actual performance is less powerful to interpret.

3.4.9.3.4 Interaction effect of message type, mood state and gender on actual performance

Mauchly's test indicated that the assumption of sphericity had been violated ($X^2(2) = 13,077$, $p < .05$). Therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = .93$). The results of the test of within-subjects effects showed that there was no significant interaction effect of message type and gender on actual performance, $F(20,45, 312,47) = 1,498$, $p = .078$. When the between-subject effects were investigated, the mixed ANOVA indicated that there was no significant interaction effect of message type, gender and mood state on actual performance between groups, $F(11, 168) = 1,031$, $p = .271$. The results of the test of equality of error variances showed that the assumption of homogeneity of variance had been violated for the occasion between the first error message and the second error message ($p < .05$). This violation makes the analyses less powerful.

⁸ In this study, there are three dependent variables for actual performance. According to the assumption of homogeneity of variance, the variance of one dependent variable should be stable at all levels of the other two variables (Field, 2005).

3.4.9.4 The participants' response time

In the following sections, main effects, interaction effects, and the contrasts of pairwise comparisons were investigated.

3.4.9.4.1 Main effect of message type on response time

The mixed ANOVA results showed that the main effect of message type on response time was significant when repeated measures of three sequenced occasions were considered, $F(4,354) = 3,198, p < .05$. Contrasts revealed that quadratic trend showed significance for three sequenced occasions, $F(2,177) = 5,590, p < .05$. In order to provide better understanding about the repeated measure results, Figure 3.15 is given below.

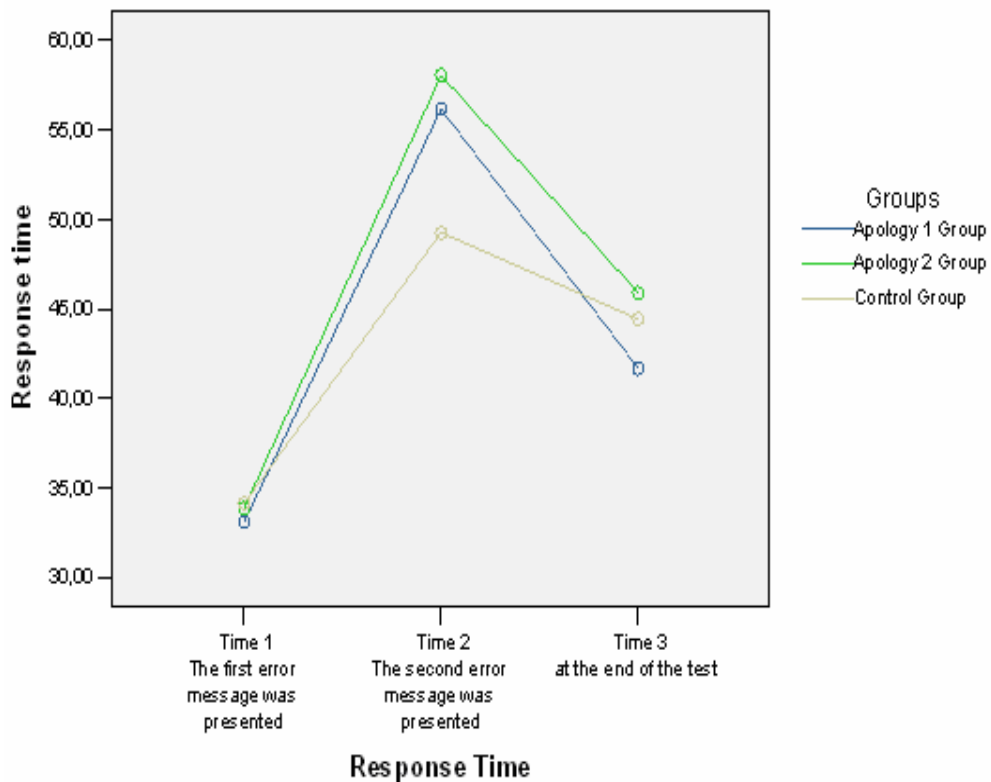


Figure 3. 15 Participants' response time

On the other hand, when the between-subjects effects were investigated, the mixed ANOVA results did not show significance among groups, $F(2,177) = 1,551, p = .215$. The descriptive statistics of response time are given in Table 3.14.

Table 3.14 Descriptive statistics of response time

	Response time 1 Before 1 st error message (sec)		Response time 2 Between 1 st and 2 nd error message (sec)		Response time 3 After 2 nd error message (sec)	
	<u>Mean</u>	<u>S.D</u>	<u>Mean</u>	<u>S.D</u>	<u>Mean</u>	<u>S.D</u>
<i>Message Groups</i>						
Apology 1 Group	33,09	9,57	56,17	20,97	41,67	14,50
Apology 2 Group	33,86	8,90	58,05	16,67	45,89	13,45
Control Group	34,14	11,97	49,26	14,21	44,43	17,26

3.4.9.4.2 Interaction effect of message type and mood state on response time

The results of the test of within-subjects effects showed that there was a significant interaction effect of message type and mood state on response time, $F(10, 348) = 2,732, p < .05$. The contrast indicated a significant quadratic trend for the three sequenced occasions, $F(5,174) = 2,998, p < .05$. However, the mixed ANOVA indicated that there was no significant interaction effect of message type and mood state on response time between groups, $F(5, 174) = 1,116, p = .354$. Figure 3.16 shows users' response time change due to the three sequenced occasions for negative mood state condition and Figure 3.17 indicated the users' response time change due to the three sequenced occasions for positive mood state condition.

Figure 3.16 shows that response time of participants having negative mood in control group increased between the time 1st error message was presented and the time 2nd error message was presented. After the second error message, the

increment in their response time ceased. Similarly, in apology groups, participants' response time increased from time 1 to time 2. After the second apology message, this incline ceased and participants' response time started to decrease. At the end of the application, participants' response time in apology groups was close to the one when they received the first error message.

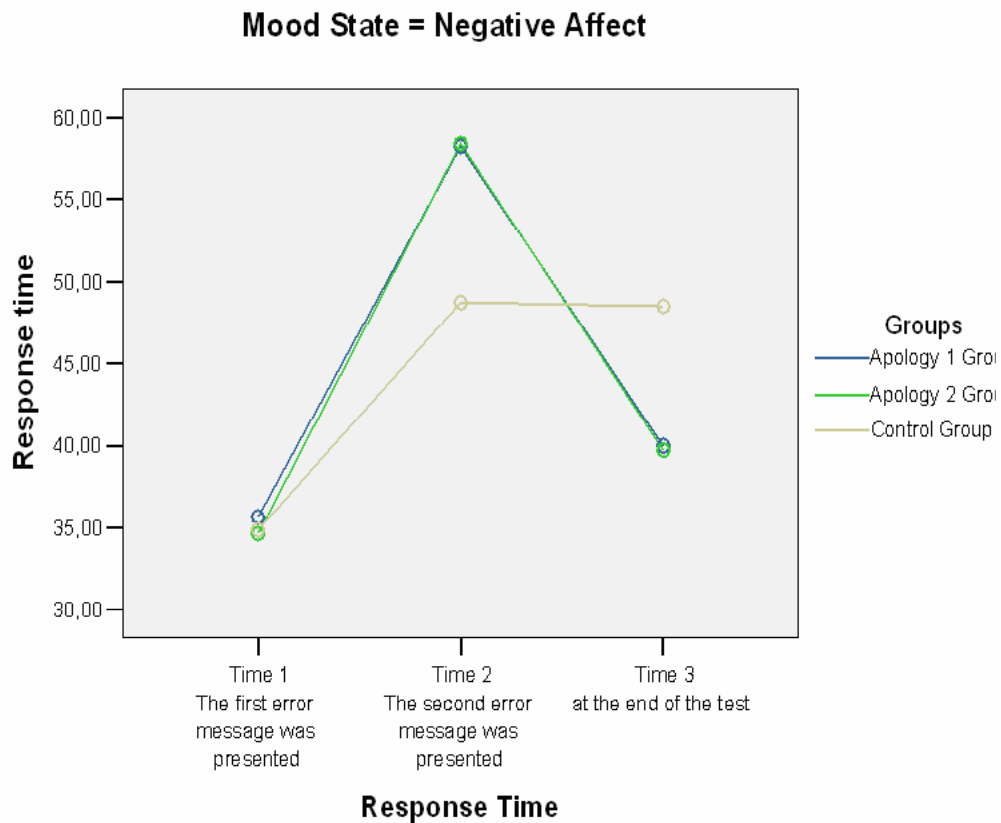


Figure 3. 16 Participants' response time at negative mood

On the other hand, for positive mood state, changes among occasions in terms of response time were different than those of negative mood state. Figure 3.17 indicates that participants' response time increased in all groups after the problem occurred. When they received the second message, participants' response time started to descend in all groups. The slopes of this decline in apology groups of positive mood state condition were smaller than those of apology groups of negative mood state condition. For control group, after the

second error message, participants' response time in negative mood state condition ceased. On the other hand, participants' response time in positive mood state condition started to decrease.

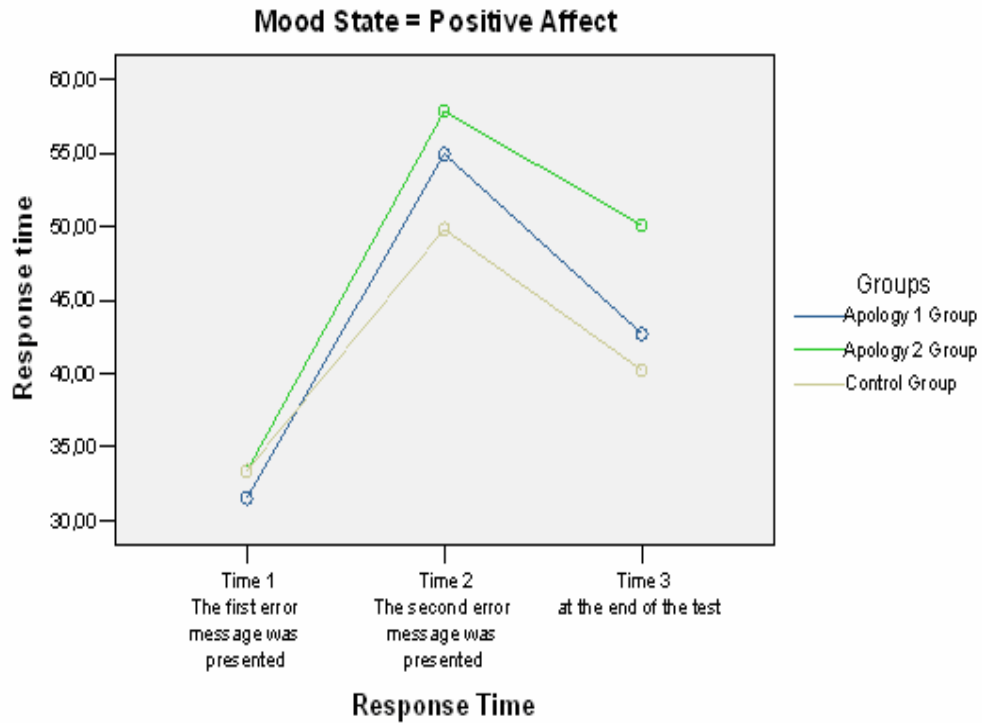


Figure 3. 17 Participants' response time at positive mood

3.4.9.4.3 Interaction effect of message type and gender on response time

The results of the test of within-subjects effects showed that there was a significant interaction effect of message type and gender on response time, $F(10, 348) = 3,039, p < .05$. The contrast indicated significant quadratic trend for the three sequenced occasions, $F(5, 174) = 3,055, p < .05$. On the other hand, when the between-subject effects were investigated, the mixed ANOVA results revealed that there was no significant effect between groups, $F(5, 174) = 1,521, p = .185$. Figure 3.18 shows female participants' response time change due to the three sequenced occasions and Figure 3.19 indicates male participants' response time change due to the three sequenced occasions.

After the first error message, female participants' response time increased in all groups. Similarly, male participants' response time ascended in all groups after the first error message. The difference between male and female participants in terms of their response time is that the overall response times for women were somewhat higher than for males. After the second error message, response times for female participants in apology groups started to decrease whereas response times for female participants in the control group continued to increase. On the other hand, male participants' response time started to decrease in all groups after the second error message.

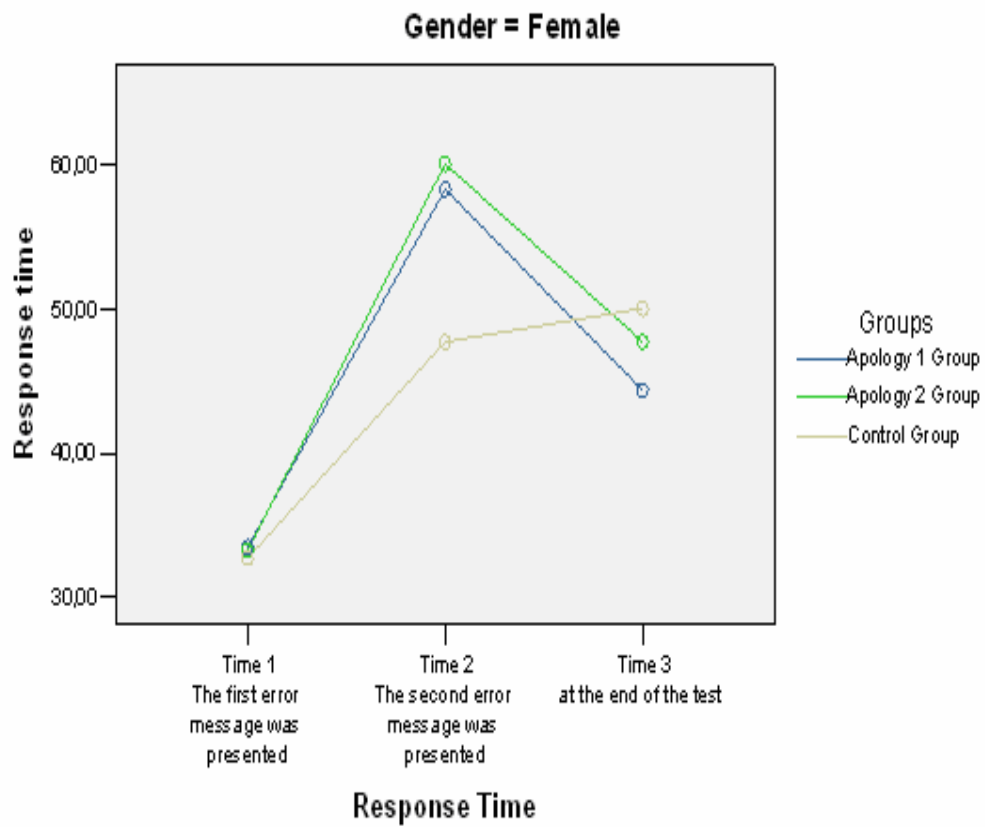


Figure 3.18 Female participants' response time

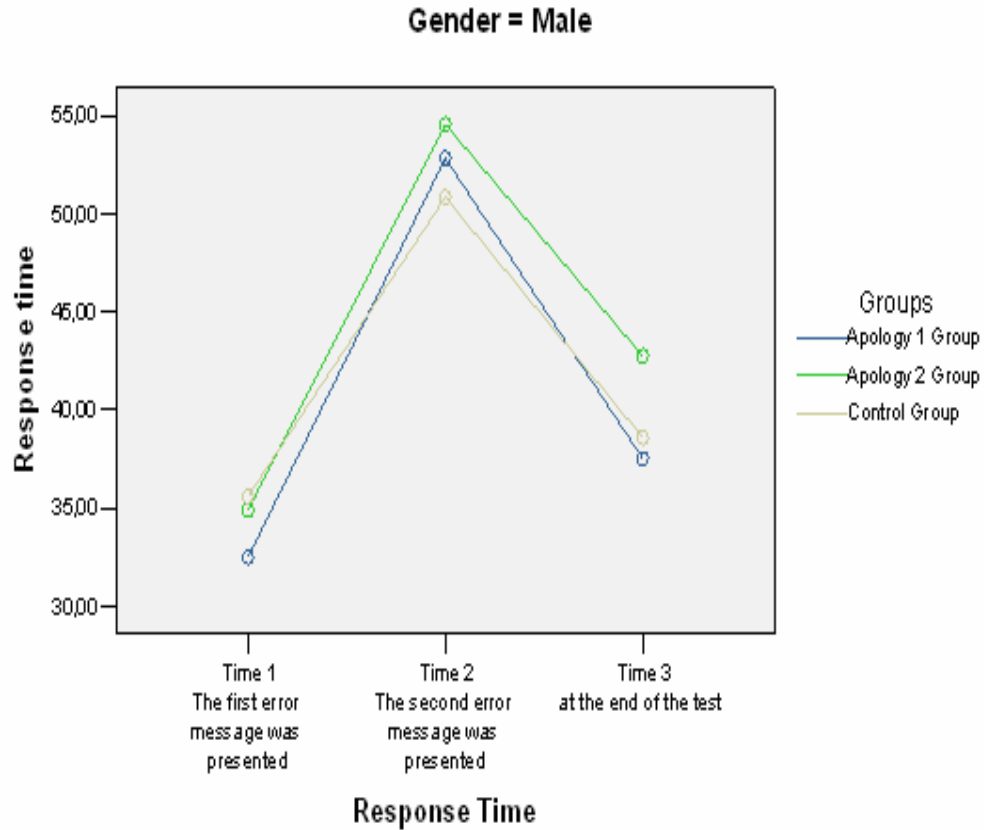


Figure 3.19 Male participants' response time

3.4.9.4.4 Interaction effect of message type, mood state and gender on response time

The results of the test of within-subjects effects showed that there was a significant three-way interaction effect of message type, mood state and gender on response time, $F(22, 336) = 2,996, p < .05$. The contrast revealed a significant quadratic trend for the three sequenced occasions, $F(11, 168) = 2,043, p < .05$. On the other hand, when the between-subject effects were investigated, the mixed ANOVA results indicated that the three way interaction of message type, gender and mood state on response time was not significant, $F(11, 168) = 1,097, p = .367$.

3.4.9.5 Correlation between dependent variables

As stated before, our data are not normally distributed. For this reason Spearman's correlation coefficient was used instead of Pearson's correlation coefficient. The results indicated that actual performance was positively related with self-appraisal of performance ($r=.178$, $p<.05$ for questions 1 to 7; $r= .499$, $p<.01$ for questions 8 to 10; $r= .215$, $p < .01$ for questions 11 to 14). As can be understood from the results, self-appraisal of performance was directly affected by participant's actual performances. In addition, another significant correlation was found when the relation between self-appraisal of performance and response time was investigated ($r=-.149$, $p<.05$ for questions 1 to 7; $r= -.046$, $p=.536$ for questions 8 to 10; $r= .168$, $p < .05$ for questions 11 to 14).

CHAPTER 4

DISCUSSION & CONCLUSION

By investigating the effect of computer apologies on self-appraisal of performance and actual performance, this empirical study was designed to shed some light on the issue of whether providing apologetic error messages is a good way to develop a more human-like computer interface for users. In this section, the results of this study are discussed by focusing on the research questions.

4.1 Discussion of the research question related to apology strategy sequences

1. Which apology strategy sequences (APSSs) are preferred by the users during their interaction with the computer?

The findings showed that 17 different APSSs were used. The percentages of the strategies used in these APSSs are as follows: 70.93% for ToR (this means that the ToR strategy was used in 70.93% of all apologies collected in this study), 68.60% for IFID, 46.51% for OoR, 19.77% for Exp, and 2.33% for PoF.

These findings are consistent with those of Hatipoğlu (2003) in that most of the collected apologies are explained by ToR and IFID strategies in Turkish culture. The findings of this study showed that ToR and IFID were the strategies which were the most widely preferred by users in the HCI context. Similarly, the findings of Hatipoğlu (2003) indicated that half of the apologies collected in her study were explained by IFID and expression of responsibility in Turkish culture

(IFID= 24% and ToR= 26%). In addition, the results of this study showed that PoF was the less preferred strategy by users in the HCI context. Similarly, Hatipoğlu (2003) indicated that it was the less used strategy in Turkish culture. Based on the similar findings of these studies, it can be inferred that apologies that one expects to get from the computer are similar to apologies utilized in HHI. Therefore, it can be said that the findings of the study supports Nass, Steuer and Tauber's (1994) idea that people tend to treat computers as social actors and the social dynamics guiding HHI are applied equally well to HCI. One explanation to this similarity between HHI and HCI in terms of use of apologies is that interacting with computers triggers our social schema relevant to situations in which use of apologies are required while interacting with computers.

The findings of this study are also consistent with those of Olshtain (1989) and Vollmer and Olshtain (1989). Olshtain (1989) indicated that respondents from the three different languages (Hebrew, Canadian French, and Australian English) utilized IFIDs between 60% and 75%, and they employed expression of responsibilities between 65% and 70%. Similarly, Vollmer and Olshtain (1989) showed that the respondents used IFID and the expression of responsibility much more than the other three strategies. Considering the findings of this study together with those of Olshtain (1989), Vollmer and Olshtain (1989), and Hatipoğlu (2003), it is revealed that IFID and ToR strategies are highly preferred strategies both in HHI and HCI. This finding also supports Cohen and Olshtain's idea that IFID and ToR are used in all situations, whereas the other three strategies are situation specific.

The data showed that gender had an effect on the preference of apology messages and the types of strategies employed in apologies. When all the derived APSSs are investigated, it was revealed that there were certain differences between the percentages of male participants and of female participants in terms of the APSS preference (e.g., IFID-OoR). This study also revealed a significant difference between the frequencies of ToR preferred by

male and female participants (Ms=86, 05% > Fs=55, 81%). Male and female participants employed IFID and OoR in their messages with different percentages (Ms = 60, 47 % < Fs= 76, 74% for IFID; Ms = 51, 16 % > Fs= 41, 86% for OoR), these differences were not significant. However, the percentages of Exp strategy utilized by both sexes were identical, while the percentages of PoF strategy employed by both sexes were equal. The findings of Hatipoğlu (2003) are partially in the same line with the findings of this study in terms of the gender difference. Hatipoğlu (2003) did not find any significant difference between male and female participants when the frequency of each strategy was investigated.

The results of this study support the criticism of the Brown and Levinson (1987)' politeness model which ignores certain variables that may have an impact on politeness such as gender, ethnicity and occupational differences (Holtgraves, 2005). This study indicates the importance of the gender variable by showing that the percentage of ToR strategy employed by males was very much more frequently than that of ToR strategy used by females.

4.2 Discussion of the research questions related to self-appraisal of performance

2. Does use of apologetic error message affect participants' self-appraisals of performances while interacting with the computer interface?
 - a) Is there any significant difference between the self-appraisals of performances of the users who received an apologetic message and of those who received a plain message?
 - b) Is there any significant difference among the users' self-appraisals of performances in the computerized environment with respect to their mood states?

In this study, the main effect of message type on self-appraisal of performance, the interaction effect of message type and mood state on self-appraisal of performance, the interaction effect of message type and gender on self-appraisal of performance, and the interaction effect of message type, mood state and gender on self appraisal of performance were investigated.

The findings showed that the main effect and all interaction effects on self-appraisal of performance were significant when repeated measures of the three sequenced occasions (the occasion before the first error message, the occasion between the first and the second error messages and the occasion after the second error message) were considered. When the difference between the three groups (two experimental and one control groups) was examined, a significant difference was found only for the interaction effect of message type and mood state on self-appraisal of performance. Other main and interaction effects on self-appraisal of performance were not significant.

The results of the study showed that the use apologetic error messages in the computerized environment did not influence users' self-appraisals of performances. These results are consistent with those of De Laere, Lundgren and Howe (1998) indicating that there was no significant difference between participants who received human-like feedback and those who received machine-like feedback in terms of self-appraisal of performance in the computerized environment. Forgas (1999) found that individuals in negative affect produced greater politeness than those in positive affect while producing requests. In other words, the level of politeness people use depends on their affective state. From this point of view, one interpretation of our results might be that the use of apologetic error messages in order to influence users' self-appraisal of performance in the computerized environment was not enough if the users' affective state was not considered. This idea is supported by another result of this study, namely that the interaction effect of message type and mood state on self-appraisal of performance was significant. However, it must be taken into

consideration that the effect size of the result was small and that is the reason why the results should be interpreted carefully.

The interaction effect of message type and mood state explains that the influence of apologetic messages on self-appraisal of performance depends on participants' mood state. The findings showed that the apologetic message including IFID, ToR and OoR strategies was more effective for users in negative mood state than the message including IFID and Exp strategies, whereas the apologetic message including IFID and Exp strategies was more effective for users in positive mood state than the message consisting of IFID, ToR and OoR strategies. These findings can be interpreted in the light of the results of Forgas (1999). Forgas (1999) investigated the participants' request preferences by considering their mood states and found that sad moods increase and happy moods decrease the level of request politeness and the effect of mood on the level of politeness is greater when more risky and unconventional requests that require more elaborate processing strategies are considered. Stated differently, Forgas (1999) showed that participants' request preferences changed according to their mood states.

Based on Forgas (1999)'s findings and the idea that apologies are one of the negative politeness strategies (Brown & Levinson, 1987), it can be speculated that users' apology preferences might depend on their mood states. Based on this speculation, it might be said that the message including IFID, ToR and OoR strategies was more effective for users in negative mood state than the other message because this message might be one of the messages preferred by users in a negative mood state, whereas the message including IFID and Exp strategies was more effective for users in positive mood state than the other message because this message might be one of the messages preferred by users in a positive mood state. This idea should be tested seeing that in the first phase of this study in which participants apology preferences were elicited, participants' mood states were not considered.

As stated above, apologetic error message including IFID, ToR and OoR strategies was more effective for subjects in a negative mood state than message including IFID and Exp strategies. The reason behind the effectiveness of the former message might be that it informed subjects about the issue that the system was responsible for the problem and the negative effects of the problem would be compensated. People in a negative mood state tend to produce more negative self-assessments, their self-confidence decreases, which leads to more self-depreciating attributions (Cervone et al., 1994; Mayer & Hanson, 1995). Therefore, users in a negative mood state most probably tended to assess their own performances negatively after they encountered the problem. When they received message including IFID, ToR and OoR, they learnt that the system was responsible for the problem and the negative effects of the problem on the task performance would be compensated. Knowing the responsibility of the system and possible attempts to be made for compensating the negative effects of the problem on the task performance might cause subjects to feel relieved, which may increase their self-confidence and produce more positive assessments about their own performances.

As can be seen in Figure 3.13, the self-appraisal of performance scores of subjects in negative mood state did not increase after they received the message including IFID and Exp apology strategies. Stated differently, employing message consisting of IFID and Exp strategies did not influence subjects' self-appraisal of their performance. The reason for this kind of result might be that in these error messages the system did not accept the responsibility of the problem. Considering this fact and the idea that people in a negative mood state tend to make more self-depreciating attributions, it may be assumed that subjects might attribute the reason of the problem to certain internal factors. The message including the source of the problem (Exp) and the direct expression of apology (IFID) might not cause subjects in a negative mood state to feel relieved, hence their self-confidence will not be increased and no positive assessments about their own performances will be produced. This can be proposed as an

explanation for the finding of a non-significant effect of the message on self-appraisal of performance.

On the other hand, the message including IFID and Exp apology strategies was more effective for subjects in a positive mood state than the message consisting of IFID, ToR and OoR strategies (see Figure 3.14). People in positive mood are more confident, ambitious and helpful so they tend to form more positive and more confident inferences (Forgas, 1999; Forgas, 1995; Mayer, McCormick & Strong, 1995). Since subjects in positive mood are more self-confident, they can produce more positive evaluations of their own performance. Therefore, even if subjects in a positive mood state received the message which did not explain that the computer was responsible for the problem they encountered, they might attribute the source of the problem to certain external factors such as the computer. The attribution of the reason of the problem to external factors might cause those subjects to assess their own performance more positively. This idea may serve as an explanation for the finding that self-appraisal of performance scores of subjects in a positive mood state increased after they received the second message including IFID and Exp strategies.

Employing the message consisting of IFID, ToR and OoR strategies did not have any influence the self-appraisal of performance scores of subjects in positive mood, although this message expressed the responsibility of the system for the problem. Based on the personality traits of people in positive mood and the role of expressing the responsibility of the system in subjects' attribution, it is expected that the message expressing the responsibility of the system for the problem should make subjects in a positive mood state produce more positive evaluations concerning the task performance. However, the results showed that self-appraisal of performance scores of subjects in apology 1 group continued to decrease after they received the second message expressing the responsibility of the system for the problem. The following reasoning of Schwarz and Clore (1983) shed some light on this unexpected finding. They found that the effects of mood on judgments disappeared when respondents attributed their feelings to

irrelevant, situational causes. Based on this idea it can be said that users who received the error message expressing the responsibility of the system and who were in a positive mood state, might attribute the responsibility of the problem to certain irrelevant internal or external factors, namely the system's inability to carry out the task or even other reasons (other than the system's inability to carry out a task). Such a possible irrelevant attribution might remove the effects of mood on self-appraisal of performance. Thus, the use of the message including IFID, ToR and OoR strategies did not influence the self-appraisal of performance scores of users in a positive mood state.

There is a crucial point related to the finding concerning the interaction effect of message type and mood state. As can be seen in Figure 3.13 and Figure 3.14, after the first error message, the self-appraisal of performance scores decreased in the three groups. After the second error message was presented by the system, in the control group, participants' self-appraisal of performance scores continued to decrease both in negative and positive mood state conditions. However, the use of apologetic error message including IFID, ToR and OoR strategies increased self-appraisal of performance scores in negative mood state condition, whereas the use of the message including IFID and Exp increased self-appraisal of performance scores in positive mood state condition.

Weiner (1979) sheds some light on the issue of why the effect of apologetic error messages showed their influence on self-appraisal of performance after the second presentation of these messages but not the first presentation. Weiner (1979) differentiated the causal attributions according to whether the perceived causes of events are stable (unchanging over time) or variable (changing over time). Individual's expectancy of future success or failure depends on the perceived stability of the cause of the previous outcome; attribution of an outcome to stable factors leads to greater typical shifts in expectancy (accretions in expectancy after success and decrements in expectancy after failure) than attribution of outcome to unstable factors. Consistent with Weiner's hypothesis, it is found that "subjects with a tendency to attribute failure to stable causes

(ability and task difficulty) indicated a stronger decrease in subsequent success expectancies than those with a tendency to attribute failure to variable causes (chance and effort)” (Försterling, 2001, p. 113).

Based on Weiner’s hypothesis, my speculation is as follows. In our study, when participants encountered the first error message, they might expect that the system would fix the problem. Between the first and the second error message, participants might not make any attribution to stable or variable causes. The reason of the decrement of participants’ self-appraisals of performances might be the problem causing participants to read the questions improperly. Once participants faced the second error message, they might realize that the problem was stable and they might attribute their perceived success or failure to a stable factor (e.g., computer’s inability). After attributing the failure to a stable factor, participants’ self-appraisal of performance in control group continued to decrease as Weiner (1979) stated. Depending on Weiner’s hypothesis, it can be said that the same decline is expected in experimental groups. However, self-appraisal of performance of participants in negative mood state in apology 1 group increased after the presentation of the second error message, while self-appraisal of performance of participants in positive mood state in apology 2 group increases. Based on these findings and Weiner’s hypothesis, it is speculated that the effects of apologetic error messages on self-appraisal of performance are observed after users attribute the failure to stable factors. This idea should be tested in future studies.

When the interaction effect of message type and gender on self-appraisal of performance and actual performance was investigated, no significant effect was found. In the first phase of the study, there was a difference between male participants and female participants in terms of their APSSs preferences. This gender difference was not considered during the message selection for the second phase and the experimental manipulation of the third phase. If the gender difference had been considered during message selection procedure and

experimental manipulation, these results would have indicated the significant difference between experimental and control groups.

Schirmer et al. (2004) found that the semantic processing in women is more susceptible to influences from emotional prosody as compared to semantic processing in men. Based on this finding, gender may be conceived of an important variable related to self-appraisal of performance and actual performance. However, a significant result was not found in this study when the interaction effect of message type, mood state and gender on self-appraisal of performance and actual performance was studied. The reason in finding no significant interaction effect might be related to the valance of the words used in the error messages. Hofer et al. (2006) found that use of positively but not negatively valenced words yielded affective changes in female, whereas employing positively or negatively valenced words did not influence male participants' affective states. Considering this finding, it can be said that positively valenced words in apology messages used in this study might influence female participants' affective mood states. Stated differently, female participants' mood states might be changed while they were dealing with the task. Thus, there is a possibility that female participants' mood states measured at the beginning of the task might be different from their mood states at the end of the task. Since participants' mood states were measured at the beginning of the task in this study, the possible changes in their mood states throughout the task were not considered in the analyses. If these possible changes in mood states had been considered, the interaction effect of message type, mood state and gender on self-appraisal of performance and actual performance might have been significant.

4.3 Discussion of the research questions related to actual performance

3. Does use of apologetic feedback affect users' real-task performance while interacting with the computer interface?

- a) Is there any significant difference between the real-task performance of the users who received an apologetic message and of those who received a plain message?
- b) Is there any significant difference among the participants' real-task performance in the computerized environment with respect to their mood states?

In order to answer these research questions, the main effect of message type on actual performance, the interaction effect of message type and mood state on actual performance; the interaction effect of message type and gender on actual performance; and the interaction effect of message type, mood state and gender on actual performance were investigated.

The findings of this study showed that the main effect of message type on actual performance and the interaction effect of message type and mood state on actual performance were not significant. There might be two explanations for these results.

The first one is based on the idea that an apology will not be effective if the sincerity behind the apology is not felt (Steiner, 2000 as cited in Tzeng, 2004). From this point of view, it can be said that individuals participated in the third phase of this study might not feel the sincerity behind the apology, so that the effects of apologetic messages were not observed.

The second explanation for the result is the possibility that the fact that the messages are verbal rather than multimodal would be influential in finding no difference. This idea is based on the several researches indicating the effectiveness of embodied agents in the computerized environment (e.g., Hone, 2006; Walker, Sproull & Subramani, 1994). Hone (2006) found that the embodied agents providing emotional feedbacks can be more effective in reducing users' frustration caused by the computer than text-based agents. Walker, Sproull and Subramani (1994) indicated that participants who received

questions in spoken form by a talking face on the computer made fewer mistakes than those receiving the same questions via text display on a screen.

The findings of this study showed that the interaction effect of message type and gender on actual performance and the interaction effect of message type, mood state and gender on actual performance were not significant. The interpretations related to these results were presented in the previous section because the interpretations of these results are the same with the results of the interactions on self-appraisal of performance.

4.4 Discussion of the research questions related to response time

4. Is there any relationship between the computer users' self-appraisals of performances and their response time after the transmission of the apologetic error messages?

The findings showed that there is a significant correlation between subjects' self-appraisals of performances and their response time. As can be seen in Figure 3.12 and Figure 3.15, while subjects' response time spent on questions increased, their self-appraisal of performance scores decreased after the first error message. Once subjects in apology groups received the second error message, their response time started to decrease, while their self-appraisal of performance scores started to increase. However, in the control group, subjects' self-appraisal of performance scores continued to decrease, while their response time started to decline. This difference shows that response time and self-appraisal are not just complementary dependent variables but that they measure slightly different things. Response time seems to be more related to the cognitive aspects of the experimental task and reflects more subjects' actual performance whereas self-

appraisal reflects the emotional and mood reaction as well as internal attribution processes. In this respect, both dependent measures taken together give a more complete picture of subjects' reaction, including cognitive and emotional aspects.

In both positive and negative mood state conditions, after the first error messages, users' self-appraisal of performance scores decreased, while their response time increased. Response time of users having negative mood state in apology groups started to decrease after the second error message, whereas, in control group, users' response time at the end of the test was nearly the same with the one when they received the second error message (see Figure 3.16). As can be seen in Figure 3.13 and Figure 16, in apology groups, it is observed that self-appraisal of performance scores of users in negative mood state decreased, while time spent on questions increased after the first error message. Conversely, after the second error message, users' self-appraisal of performance scores in apology 1 group started to increase and self-appraisals of performances of users in apology 2 group did not change, while time spent on questions decreased in both apology 1 and apology 2 groups. In control group, users' self-appraisal of performance scores continued to decrease while time spent on questions did not change after the second error message.

As can be seen Figure 3.14 and Figure 3.17, after the second error message, self-appraisal of performance scores of users having positive mood state in apology 2 groups started to increase, while time spent on questions decreased. Conversely, self-appraisal of performance scores of users having positive mood state in apology 1 and control groups continued to decrease, while time spent on questions declined after the second error message.

These findings showed that the relationship between users' self-appraisals of performances and response time depends on their mood states and the type of message used.

When two-way interaction of mood state and message type on response time (see Figure 3.16 and Figure 3.17) and the interaction of gender and message type on response time (see Figure 3.18 and Figure 3.19) are investigated together, it is revealed that female computer users behaved as users in negative mood state, whereas male computer users behaved as users in positive mood state. This finding is supported by the previous studies. Clore, Schwarz and Conway (1994) suggest that happy moods lead to heuristic processing, whereas sad moods result in more effortful processing. Based on gender researches, it is suggested that females have a greater tendency for detailed processing, whereas males have a greater propensity for heuristic processing (Dube & Morgan, 1996; Meyers-Levy & Maheswaran, 1991). When the findings of these previous studies are considered together, it is understood that females seem to have the features of individuals in negative mood state, whereas males seem to have the features of individuals in positive mood state. This idea is consistent with the finding of this study.

4.5 Discussion of the findings in terms of HHI

As stated in Chapter 1, computer-mediated interaction is employed in studies investigating cognitive and information processing variables that facilitate affective influences on interpersonal behavior. Since the computer was used as a part of an interaction in this study, the findings of this study can be interpreted in terms of their influences on interpersonal behavior.

Leech (1983) put forwards a politeness principle which is utilized in order to eliminate communicative discord and to maintain comity. Leech proposed six types of politeness maxims which mainly aim to achieve maximum benefit for speaker and hearer at the minimum cost. The other politeness view, the face-saving view of politeness, is proposed by Brown and Levinson (1987). In their view, they mention rational model person who is able to choose the appropriate way to maintain the mutual relationship by saving faces of both her/himself and the hearer in the most efficient way possible. The main problem of these views is

that they do not give an explanatory answer to the following question: How does the speaker make a choice among types of polite expressions or utterances? Brown and Levinson attempt to explain the speaker's decision making process about which politeness strategy is the best one for mitigating FTAs. They state that relative power of the speaker with respect to the hearer and social distance between the speaker and the hearer are two important variables that should be considered when the most suitable politeness strategy is selected. However, they did not investigate the role of affective variables in speakers' decision making process. Janney and Arndt (1992) stress the significance of emotive expressions by saying that feelings play an important role in interpersonal relationships and the expression of feelings varies considerably among people. This study, which investigated whether different types of apology expressions influence self-appraisal of performance in different ways, revealed the importance of hearer's mood state in determining what apology message is used for affecting self-appraisal of performance. Considering the findings of this study and the fact that apology is a type of politeness strategy, it can be speculated that the hearer's mood state should be taken into account by the speaker when determining the best politeness strategy for a specific situation, since mood state has an influence on interpersonal behavior (Forgas, 1999). In addition, affective variables that have possible effects on interpersonal behavior should be taken into consideration by views of politeness.

This study indicated that the influence of apology messages on self-appraisal of performance depends on computer users' mood state. These findings can be adapted to social context in the following way. Individuals in negative mood state tend to produce more negative assessments and lead to more self-depreciating attributions, compared to individuals in positive mood state. In order to make hearers in negative mood states produce more positive assessments about their performances and in order to make them more self-confident, speakers can present apologies including expression of responsibility and information about how the negative effects of the problem will be compensated. On the other hand, expressing the source of the problem in an

apology is enough for individuals in positive mood state so as to increase their self-appraisals of performances, because individuals in positive mood states tend to produce more positive evaluations and lead to more self-confident inferences. Namely, offering an apology including ToR and OoR strategies might not be an effective way in order to make a difference on self-appraisals of performances of hearers in positive mood state. Based on these findings, it can be said that the hearer's mood state and the content of the message are taken into account in HHI in order to influence the hearer's self-appraisal of performance.

4.6 Conclusion

The findings of this study show that the frequencies of apology strategies preferred in a computerized environment are similar with those utilized in a social context. This finding supports the idea that the social dynamics guiding HHI are applied equally well to HCI. In addition, different apologetic error messages produced with respect to the elicited APSSs have different effects on users' self-appraisals of performances in relation with their mood states (positive versus negative).

Since the field of the Pragmatics of Human-Computer Interaction does not have a long history, the topic about what dynamics of HHI can be applied to HCI has not been studied in detail. This study presents a new point of view for the future studies in the field of the Pragmatics of Human-Computer Interaction by making two original contributions around the following findings: (1) The error message including direct apology, expression of responsibility and intention for offering a repair was useful for users in negative mood state, (2) the error message consisting of direct apology and expression concerning the source of the problem was convenient for users in positive mood state.

The first contribution is that the contents of the apologetic error messages are very important and the use of different contents of apologies might lead to different effects on users. Stated differently, it is possible that the use of different

human-like messages in terms of contents might lead to different results in the computerized environment. In the research studies which aim to develop more human-like computer interfaces, it is advised that this point is taken into account.

The second contribution is that this study shows the significance of users' mood state in understanding the real effect of human-like messages (e.g., apologies) on users' self-appraisals of performance in the computerized environment. Namely, if the effect of human-like messages on evaluative judgments (e.g., self-appraisal of performances) is investigated, taking users' mood state into account is important for revealing the real effect of human-like messages because the effect of mood state on evaluative judgments is one of the most reliable phenomena in the cognition-emotion literature (Picard, 1997). Therefore, considering users' mood state during the design of the human-like interface can be beneficial and the studies on human-like interfaces can be designed in the light of this finding. In addition, the previous studies concerning human-like messages can be re-conducted by considering mood state in the experimental manipulation because mood state is a crucial factor affecting individual's cognitive processes such as metacognitive processes (Efklides & Petkaki, 2005).

This study has also a potential to contribute to the field of affective computing which aims to deliver affective interfaces (Reynolds & Picard, 2001) such as human-like interfaces in which apologetic error messages are presented instead of plain computer messages. Picard (1997) mentioned certain applications with various affective abilities such as a computer tutor that recognizes users' affect to individualize its teaching strategy. In the same vein, the findings of this study show the importance of developing affective interfaces that recognize users' affect to individualize the apologetic error messages.

4.7 Limitations of the study

There are a number of limitations in the methodology used in this study. First, sample size is limited. Second, in this study the participants of the first phase and

the third phase were not the same participants. APSSs preferred by the individuals participated in the first phase might be different than those preferred by the individuals participated in the third phase. Therefore, different results would have been found if the same participants had been involved both in the first phase and the second phase. Third, in the DCT used in the first phase participants were not informed about the point that they had a chance to leave the DCT blank. Fourth, the instructions of the DCT included the polite expression (*lütfen bekleyin!*). The inclusion of the word “lütfen” might affect the participants’ APSS preferences because of its positive valence. Finally, although gender difference was found in terms of apology preferences in the first phase, this difference was not considered during the experimental manipulation of the third phase. If this difference had been taken into account in the experimental manipulation, there would have been four experimental groups and one control group in the third phase and approximately eighty more participants would have been required. Since we hesitated to reach that number of participants, the gender difference was deliberately ignored during experimental manipulation.

4.8 Directions for future research

This study recommends the following further studies to overcome limitations and their effects on the results.

In the first phase of this study, the DCT was used to reveal apology preferences of the participants. However, the participants’ mood states were not considered in this phase. Forgas (1999) found that requests preferred by individuals changed with respect to their mood states. It is possible to reach similar results if participants’ mood states are considered while eliciting their apology preferences, which might be an extension to this study.

After eliciting the APSSs with respect to participants’ mood states, another study may be conducted in order to find an answer to the following questions: Does the apologetic message preferred by users in positive mood state influence the self-

appraisals of performances of users in positive mood state better than the message preferred by users in negative mood state? Does the apologetic message preferred by users in negative mood state influence the self-appraisals of performances of users in negative mood state better than the message preferred by users in positive mood state? In order to find out answers to these questions, two different apologetic messages might be considered during the design phase: a message preferred by users in positive mood state and a message preferred by users in negative mood state.

The results of the first phase of this study showed that the percentages of APSSs preferred by the male participants and those of APSSs preferred by the female participants were different. However, this difference was not considered in the design of the third phase. If this difference had been considered during the manipulation of the experiment, different results would have been observed. In order to gain better understanding about this point, another study considering gender difference may be conducted.

How the information is evaluated by individuals is very important in social context, for they employ the results of their evaluations to draw causal conclusions (Fosterling, 2001). They might attribute the cause of action four different factors: external-stable factors (e.g., task difficulty), external-variable factors (e.g., luck), internal-stable factors (e.g., ability) and internal-variable factors (e.g., effort) (As cited in Försterling, 2001). By the same token, how the information is evaluated by users might be important in the computerized environment because they might utilize the results of their possible evaluations to draw causal conclusions about their failure. This point was not considered in this study. It may be useful to take this point into consideration in another study because knowing the factors that users attribute their failure in the computerized environment might provide better insight to interpret the findings.

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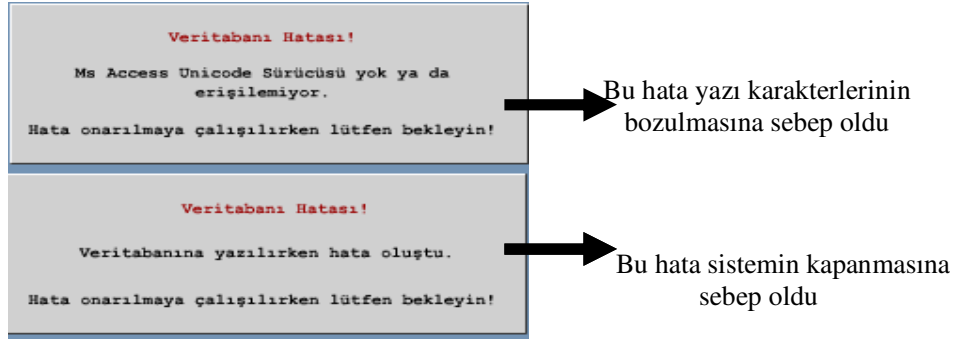
APPENDICES

APPENDIX A: DISCOURSE COMPLETION TEST

Değerli katılımcı,

Lütfen aşağıdaki ifadeleri dikkatlice okuyunuz ve sizden doldurulması istenen metin kutusunu doldurunuz.

Eğitim Teknolojileri ile ilgili online dersi alırken sistemden kaynaklanan hatalar nedeniyle ders esnasında bazı sorunlar ile karşılaştınız. Ardından sistem tarafından sorunlar ile ilgili olarak aşağıdaki mesajlar verildi.



Sistemden kaynaklanan nedenlerden dolayı hatalar oluştuğunda ve sistem kaynaklı bu hataların performansınız üzerinde olumsuz bir etki bıraktığı durumlarda (bozuk karakterlerin soruları okumanızı ve cevaplamanızı zorlaştırması gibi), bilgisayarın sizden özür dilemesi gerektiğini düşünseydiniz, sistem tarafından verilen yukarıdaki her iki mesaj yerine nasıl bir hata mesajı almak isterdiniz?

Lütfen sistem tarafından verilmesini istediğiniz hata mesajını aşağıdaki metin kutusuna yazınız.

APPENDIX B: APOLOGY PERCEPTION RATING

Değerli Katılımcı

Aşağıdaki açıklamaları lütfen dikkatli bir şekilde okuyunuz.

Size bilgisayar tarafından materyal geliştirme ile ilgili olan bir içerik sunuldu. Daha sonra, içeriğe uygun olarak hazırlanmış kısa bir test aldınız. Testin ikinci sorusunun görüntülenmesi esnasında bilgisayardan kaynaklanan bir problem ile karşılaştınız ve sistem tarafından probleme ilişkin olarak verilen bir hata mesajı ile problem hakkında bilgilendirildiniz. Verilen hata mesajı sonrasında problem çözülemedi ve kalan sorular hatalı bir şekilde görüntülendi.

Hatanın sistemden kaynaklanması nedeniyle,

Hata oluştuğunda sistem tarafından size sunulan mesaj yerine, benzer durumlarda kullanılmak üzere, özür ifade eden başka bir mesajın verilmesi düşünülmektedir. Bu amaç için üç mesaj seçilmiş olup bu mesajların, özür ifadesi bakımından uygunlukları incelenmektedir.

Her mesaj için,

Özür ifadesi bakımından, aşağıdaki mesajların uygunluk derecesini belirtiniz. Eğer mesaj sizin için bir özür mesajı ise ve uygunluk derecesi çok yüksek ise 7 seçeneğini, eğer mesaj sizin için bir özür mesajı değilse 1 seçeneğini işaretleyiniz.

Mesajlar	Uygunluk Derecesi						
	<--Az uygun			=	Çok uygun -->		
Sistemden kaynaklanan problemler nedeniyle oluşan hata onarılamamaktadır. Özür dileriz. Oluşan hatanın performansınız üzerindeki olumsuz etkileri, yapılacak değerlendirme sırasında göz önünde bulundurulacaktır	1	2	3	4	5	6	7
Soruların görüntülenmeye çalışıldığı sırada meydana gelen bir hata nedeniyle Türkçe karakterler düzgün bir şekilde görüntülenmemektedir. Hatadan dolayı özür dileriz.	1	2	3	4	5	6	7
Oluşan hata onarılamadı	1	2	3	4	5	6	7

APPENDIX C: MOOD STATE QUESTIONNAIRE

Değerli Katılımcı

Aşağıda belirtilen duygu halleri **bu gün** için size ne kadar uygundur?

Eğer çok uygunsa 5'i, hiç uygun değil ise 1'i seçiniz. Her duygu hali için size en uygun olan rakamı seçiniz.

Duygu Hali	Uygunluk Derecesi				
İyiyim	1	2	3	4	5
Sakinim	1	2	3	4	5
Mutluyum	1	2	3	4	5
Heyecanlıyım	1	2	3	4	5
Hoşnutum	1	2	3	4	5
Üzgünüm	1	2	3	4	5
Hüzünlüyüm	1	2	3	4	5
Endişeliyim	1	2	3	4	5
Karamsarım	1	2	3	4	5
Hayal kırıklığı içindeyim	1	2	3	4	5

APPENDIX D: MESSAGES PRODUCED BASED ON APSSs

APSS	Messages in Turkish
ToR-IFID	Sistemden kaynaklanan problemler nedeniyle oluşan hata onarlamamaktadır. Özür dileriz.
IFID-ToR-OoR	Sistemden kaynaklanan problemler nedeniyle oluşan hata onarlamamaktadır. Özür dileriz. Hatanın performansınız üzerindeki olumsuz etkileri yapılacak değerlendirme sırasında göz önünde bulundurulacaktır.
ToR-OoR	Sistemden kaynaklanan problemler nedeniyle oluşan hata onarlamamaktadır.Hatanın performansınız üzerindeki olumsuz etkileri yapılacak değerlendirme sırasında göz önünde bulundurulacaktır.
IFID	Hata onarılamadı. Özür dileriz.
ToR	Sistemden kaynaklanan problemler nedeniyle oluşan hata onarılamamaktadır.
IFID-ToR-EXP	Soruların görüntülenmeye çalışıldığı sırada sistemden kaynaklanan bir problem nedeniyle, Türkçe karakterler düzgün bir şekilde görüntülenememektedir. Özür dileriz.
IFID-OoR	Hata onarılamadı. Özür Dileriz. Hatanın performansınız üzerindeki olumsuz etkileri yapılacak değerlendirme sırasında göz önünde bulundurulacaktır.
OoR	Hata onarılamadı. Hatanın performansınız üzerindeki olumsuz etkileri yapılacak değerlendirme sırasında göz önünde bulundurulacaktır.
EXP-IFID	Soruların görüntülenmeye çalışıldığı sırada meydana gelen bir hata nedeniyle, Türkçe karakterler düzgün bir şekilde görüntülenememektedir. Özür dileriz.
ToR-EXP-OoR	Soruların görüntülenmeye çalışıldığı sırada sistemden kaynaklanan bir problem nedeniyle, Türkçe karakterler düzgün bir şekilde görüntülenememektedir.Hatanın performansınız üzerindeki olumsuz etkileri yapılacak değerlendirme sırasında göz önünde bulundurulacaktır.

IFID-EXP-OoR	Soruların görüntülenmeye çalışıldığı sırada oluşan bir hata nedeniyle, Türkçe karakterler düzgün bir şekilde görüntülenememektedir. Özür dileriz. Hatanın performansınız üzerindeki olumsuz etkileri yapılacak değerlendirme sırasında göz önünde bulundurulacaktır.
IFID-ToR-Exp-OOR	Soruların görüntülenmeye çalışıldığı sırada sistemden kaynaklanan bir problem nedeniyle, Türkçe karakterler düzgün bir şekilde görüntülenememektedir.Hatanın performansınız üzerindeki olumsuz etkileri yapılacak değerlendirme sırasında göz önünde bulundurulacaktır. Özür dileriz.
TOR-EXP	Soruların görüntülenmeye çalışıldığı sırada sistemden kaynaklanan bir hata nedeniyle, Türkçe karakterler düzgün bir şekilde görüntülenememektedir.
EXP-OOR	Soruların görüntülenmeye çalışıldığı sırada oluşan bir hata nedeniyle, Türkçe karakterler düzgün bir şekilde görüntülenememektedir. Hatanın performansınız üzerindeki olumsuz etkileri yapılacak değerlendirme sırasında göz önünde bulundurulacaktır.
IFID INTENS	Hata onarılamadı. Çok özür dileriz.
IFID-TOR-POF	Sistemden kaynaklanan problemler nedeniyle oluşan hata onarılamamaktadır. Özür dileriz. Bir daha bu problem ile karşılaşmamanız için gerekli düzenlemeler yapılacaktır.
IFID-TOR-POF INTENS	Sistemden kaynaklanan problemler nedeniyle oluşan hata onarılamamaktadır. Çok özür dileriz. Bir daha bu problem ile karşılaşmamanız için gerekli düzenlemeler yapılacaktır.