

Comprehension of factual, nonfactual, and counterfactual conditionals by Iranian EFL learners

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ABSTRACT

A considerable amount of studies have been established on conditional reasoning supporting mental model theory of propositional reasoning. Mental model theory proposed by Johnson- larid and Byrne is an explanation of someone's thought process about how something occurs in the real world. Conditional reasoning as a kind of reasoning is the way to speak about possibilities or probabilities. The aim of present study was to investigate comprehension of English factual, nonfactual, and counterfactual structures by Iranian EFL learners advocating mental model theory of propositional reasoning. To this end 68 learners studying EFL in 4 language centers participated in the study. A consistency judgment test adopted from Byrne & Tasso (2002) was administered to determine comprehension of 3 English conditional types in indicative vs. subjunctive mood, and past or present tense aspect i.e. Factual, nonfactual, and counterfactual structures. The data were analyzed through a repeated measure one-way ANOVA. The result showed that when participants encountered factual conditional having a general knowledge that it is real, possible and very likely to fulfill, build a mental model of its premises and are more likely to perceive that indicative conditional is consistent with the truth of antecedent and consequent(TA-TC). Also when encountering a nonfactual or counterfactual conditional in subjunctive mood having a general knowledge that it is very unlikely or impossible to fulfill, participants build a mental model of its premises, and are more likely to perceive that subjunctive conditional is consistent with the falsity of antecedent and consequent(FA-FC).

Key words: *conditional reasoning, indicative mood, subjunctive mood, factuals, nonfactuals, counterfa*

INTRODUCTION

Grammar is very important as it is what makes it possible for us all to communicate and understand what we see and what we say. We learn basic grammar when we start to put sentences together as children. But, the actual knowing of grammar is much more complex. Grammar teaches us how to build sentences, about the types of words that we use and when we should use them (Folega, 2012).

As a branch of English grammar it is common to think of "if", also as one of the main areas of logical reasoning. As a kind of conjunction the meaning of a conditional sentence is a straightforward product of the meaning of its component clauses. Conditional tense is used when an action depends on another action; also it is a central part of thinking (Johnson-Larid & Byrne 2002). Among different types of conditionals, counterfactuals have been a topic in philosophy, cognitive psychology, and linguistics for several decades (Hajak, 2002). It refers to a situation that once was a factual possibility but that didn't happen (Johnson-Larid & Byrne, 2002). One important feature of counterfactuals is their dual meaning representation, a conjecture and a presupposed fact (Fauconnier, 1994; Byrne, 2002, 2007; De veg, Urrutia & Riffo, 2007, 2011; Johnson-Larid & Byrne, 2002; Santamaria, Epsino & Byrne, 2002; Thompson & Byrne, 2002). Regardless of the existence of prominent works in conditional reasoning and counterfactual thinking, far too little attention has been paid to the interpretation of conditional structures by Iranian EFL Learners. So I will consider the way they are interpreted by Iranian EFL learners. Confirming that after reading a factual sentence readers represent TA-TC interpretation. But after reading a nonfactual and counterfactual structure readers represent FA-FC interpretation.

STATEMENT OF THE PROBLEM

Conditional reasoning is used to make inferences about a situation in which the occurrence of one event is conditional to the occurrence of another event. It is often represented in the basic form of "if p then q" where p is referred to as antecedent and q as consequent (Thompson, 1994).

We have 3 main types of conditionals namely: 1) factual conditionals in indicative mood, and past or present tense that refer to present or future time they are real, possible and very likely to fulfill 2) nonfactual conditionals in subjunctive mood and past tense, that refer to present time they are hypothetical and very unlikely to fulfill, although the tense is past, we are talking about the present, now and 3) counterfactual conditionals in subjunctive mood and past perfect tense, we are talking about a situation that was not so in the past. They are unreal and impossible to fulfill.

Conditional reasoning in its most basic sense involves making inferences with a given major premise of form "p implies q" and one of the 4 possible minor premises. for example in a conditional statement such as "if the car is out of gas, then it stalls".

Modus ponens (MP) is a logical principle that involves reasoning with the premises "p implies q", p is true therefore logically correct conclusion q is true. *The car is out of gas, therefore it stall.*

Modus tollens (MT) is reasoning with the premises "p implies q", q is false, therefore logically correct conclusion p is false. *The car hasn't stalled, therefore it didn't turn out of gas.*

Affirmation of antecedent (AC) reasoning with the premises "p implies q" q is true therefore p is true. *The car has stalled, therefore it has run out of gas.*

Denial of consequent (DA) reasoning with the premises "p implies q" p is false therefore q is false. *The car doesn't run out of gas, therefore it will not stall.* (Evans, Newstead, Byrne, 1993; Thompson, 1994; Thompson, & Byrne, 2002).

Among different types of conditionals the rise in interest in counterfactuals has been a rather recent phenomena (Hajak, 2002). As Fauconnier (1985) "Counterfactuals are viewed as cases of possibly valid reasoning from premises that are false in actuality". (chapter4, p 109). Counterfactuals convey a dual representation. (Fauconnier, 1985; Byrne, 2002, 2007; De veg, Urrutia & Riffo, 2007, 2011; Johnson-

Larid & Byrne,2002; Santamaria, Epsino& Byrne,2002 Thompson& Byrne,2002). It means that people think about some ideas by keeping in mind two possibilities that effect their way of thinking in many situations. For example suppose a counterfactual conditional statement: "*if Mike had left at 9 a.m. then he would have caught the airplane*. You may think initially about two possibilities; the conjecture, "*Mark left at 9 a.m. and he caught the airplane*, and the presupposed facts, *Mark didn't leave at 9 a.m. and he didn't catch the airplane*. Suppose you then discover that *Mark didn't catch the airplane*, then you are able to infer that *Mark didn't leave at 9 a.m.* Again suppose you discover that *Mark left at 9 a.m.* then you are able to infer that *Mark caught the airplane*. (Byrne, R.M.J, 2007).

SIGNIFICANT OF THE STUDY

Propositional deductive reasoning in general and conditional reasoning in particular have been widely investigated by cognitive scientists, psychologist and philosophers and linguistics (stalnaker,1968; Lewis,1973; Byrne,2002)

Learning English conditionals is very important because its structure is used in everyday conversation. As Johnson-larid & Byrne (2002) "you reason about conditional relations because much of your knowledge is conditional. Conditional reasoning is central part of thinking". As Qin (2013) conditionality is a linguistic concern as well as philosophical one. The property of conditionality arouses the linguistic insight of grammar, semantics and cognitive approaches.

The more one practices, the closer he/she gets to master the English language. But first we need to know what the role of conditional is in the structure of the grammar in English. The conditional is the way we speak about possibilities or probabilities. A lot of the use is dependent on the speakers' or writers' own perspective; for example Hillary Clinton might say "*if I become president, I will end the war*". Hillary Clinton has a real possibility of being the president of the United States. A student in your class might say "*if I become a president, I will end the war*". Your student don't see becoming president as a real possibility. Conditional sentences have linguistically and cognitively complex structures that express a variety of meaning through a variety of form used for variety of discourse functions such as giving advice or warning: "*if I were you, I wouldn't do that*" Conditional type 2. Or maybe they are used to express regret: "*if I had finished my work earlier, I would have gone to the movie*" Conditional type 3.that's why they are considered a big obstacle for EFL teachers and students (Norris, 2003).

Among different types of conditionals counterfactuals have been a topic in cognitive, social and developmental psychology as well as linguistics for several decades and recently have received attention in psycholinguistics (Hajak,2002). Counterfactuals have been widely studied by social psychologists in casual judgments and in learning from mistakes. On the other hand cognitive psychologists have explored the rule of counterfactuals in reasoning (Stalnaker, 1968; Lewis, 1973; Byrne, 2002). As Goodman (1983) "The analysis of counterfactual is no fussy little grammatical exercise. Indeed, if we lack the means for interpreting counterfactual conditionals, we can hardly claim to have any adequate philosophy of science"(chapter1:3). Counterfactuals seem to be understood differently from factual conditionals (Byrne, 1997). People may understand a factual conditional by considering the occurrence of antecedent and consequent, but counterfactuals are understood by falsity of antecedent and consequent. (Thompson & Byrne, 2002).The thought about what might have been seen to amplify certain emotions such as regret, guilt, shame, relief, hope and anticipation. The emotion seem to depend on a comparison between how the event actually is and how it could have or should have been. Also creating alternative to reality gives us an explanation of the world (Byrne, 2007).

RESEARCH QUESTIONS

Question 1: How conditionals in indicative mood and past or present tense (factual conditionals) are treated by Iranian EFL learners?

Question 2: How conditionals in subjunctive mood and past tense (nonfactual conditionals) are treated by Iranian EFL learners?

Question 3: How conditionals in subjunctive mood and past perfect tense (counterfactual conditionals) are treated by Iranian EFL learners?

CONDITIONALS

As mentioned earlier mental model theory proposed by Johnson-Laird (1983) is the theory that has a great deal of success as a theory underlying conditional reasoning. A considerable amount of literature has been published on conditional reasoning supporting mental model theory of propositional reasoning. Evans (1993) considered a significant part of mental model theory, i.e. the mental model account of conditional reasoning. He believed that this kind of reasoning constitutes the largest area of study in the psychology of human reasoning in general and deductive inferences in particular.

Thompson (1994) defined conditional reasoning as an area of reasoning that makes inferences about a situation in which occurrence of one event is conditional to the occurrence of another event. It is often presented in the form of "if p then q", where p is referred to as antecedent and q as consequent. Conditional reasoning involves making inferences with a given major premise of the form "p implies q", and of the four possible minor premises. For example in a conditional statement such as "if the car is out of gas, then it stalls".

Modus ponens (MP) is a logical principle that involves reasoning with the premises "p implies q", p is true therefore logically correct conclusion q is true. "The car is out of gas, therefore it stalls".

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Affirmation of antecedent (AC) reasoning with the premises "p implies q" q is true therefore p is true. "The car has stalled, therefore it has run out of gas"

Denial of consequent (DA) reasoning with the premises "p implies q" p is false therefore q is false. "The car doesn't run out of gas, therefore it will not stall". (Thompson, 1994; Thompson, & Byrne, 2002).

TYPES OF CONDITIONALS

There are 4 main types of conditional sentences:

Zero-type conditionals= if + simple present+ simple present

If I study, I pass the exam

Type 1= if + simple present+ future

If I study, I will pass the exam

Type 2=if+ simple past+ would infinitive

If I studied, I would pass the exam

Type 3= if+ past perfect+ would have+ past participle

If I had studied, I would have passed the exam

Zero-type conditionals describe situations that are always true if something happens. In zero-type conditionals, both "if clause" and "then clause" are in simple present tense.

Conditionals type 1 are classified as real conditionals they are presented in present tense and indicative mood, since they are possible and very likely to fulfill we call them factual conditionals. In type one conditional "if clause" is in simple present tense and "then clause" in simple future tense.

Conditionals type 2 are classified as hypothetical conditionals, they are possible but very unlikely to fulfill, and we call them nonfactuals. They are used to refer to a time that is now or any time, and a

situation that is in some one's mind. These sentences are not based on fact. In type 2 conditional sentences, the "if clause" uses the simple past, and the main clause uses the would infinitive. They are in subjunctive mood and past tense, but we are talking about the present.

Conditionals type 3 are classified as unreal conditionals that are presented in past perfect tense and subjunctive mood, since they are impossible to fulfill we call them counterfactuals .i.e. contrary to fact. Conditional type 3 uses past perfect tense in "if clause" and would have plus past participle in "then clause".

Skhaeken, Schroyens and Diessaert (2001) reported two kind of "if- then" assertions in logic. 1) indicative, factual conditionals" if there is an A on one side of the card, then there is a 2 on the other side". And 2) subjunctive, counterfactual or contrary to fact conditionals. " if there had been an A on one side of the card, then there would have been a 2". They discussed four inferences of conditionals, MP, MT, DA, and AC. The latter two inferences are invalid for true conditionals" if p then q" but valid for bi-conditionals" if and only if p then q". They tested the influence of different tense of indicative conditionals on making inferences and the existence of the interaction of explicit negation. They compared reasoning with indicative conditionals in three tenses of past, present and future by manipulating the presence and absence of explicit negation. As predicted by Byrne earlier, their result also confirmed that there is no differences between assertions in different tenses with respect to the construction of models. Their data showed an effect of both affirmative premise bias and negative conclusion bias. Result showed that an MP inferences was more difficult with a negative antecedent, likewise an AC inferences was easier with an affirmative consequent and a DA was easier with negative antecedent. There was no effect of affirmative premise bias on MT.

COUNTERFACTUALS

The philosophical study of conditionals goes back at least as far as the Stoics of ancient Greece. Among different types of conditionals the rise in interest in counterfactuals has been a rather recent phenomena (Hajak, 2002).Byrne and Tasso (1999) believed that counterfactuals somehow mean different from their corresponding factual conditionals, that's why progress in understanding them has been slow. Counterfactuals have been a topic in cognitive, social and developmental psychology as well as linguistics for several decades and recently have received attention in psycholinguistics. Counterfactuals have been widely studied by social psychologists in casual judgments and in learning from mistakes. On the other hand cognitive psychologists have explored the rule of counterfactuals in reasoning (De Vega & Urrutia 2012). A counterfactual possibility refers to a situation that once was a factual possibility but that didn't occur (Johnson-Larid, & Byrne, 2002). Counterfactuals are emotional amplifiers that may result in positive or negative social emotions of satisfaction, relief, and guilt and regret (de Vega & Urrutia 2012). As Fouconnier (1997) "counterfactuals, set up, alongside a presupposed reality, an imagined situation counter to fact. Counterfactual expressions are not just fanciful flights of the imagination; they are meant to have actual impact on reality and the shaping of real events."

As Kulakova (2011) people at some times of their lives especially when the true circumstances is bothering for them may suppose alternatives to their earlier decision action and existing circumstances. Since such considerations are counter-to-fact we call the counterfactuals. Counterfactuals are commonly represented in past perfect tense and subjunctive mood to convey the fact-violating nature of the statement. The grammatical form of the counterfactuals is seen in the form "if- then" construction. He also had a brief overview of philosophical approaches to counterfactuals by Adams (1970), Stalenaker (1968), and Lewis (1973). Psychological approaches to counterfactual thinking was founded by Kahenman and Miller(1986).he also considered mental model theory proposed by Johnson-larid & Byrne(1983) as theory underlying counterfactual thinking. Based on mental model, because of working memory limitation, initial representation of conditional reasoning represents some explicit and some implicit information. For an indicative conditional there is one positive mental model, but in the case of a counterfactual there are 2 possibilities; the suppositional positive case and a presupposed negative fact. That article investigated the neural basis of thinking about counterfactual and hypothetical conditionals

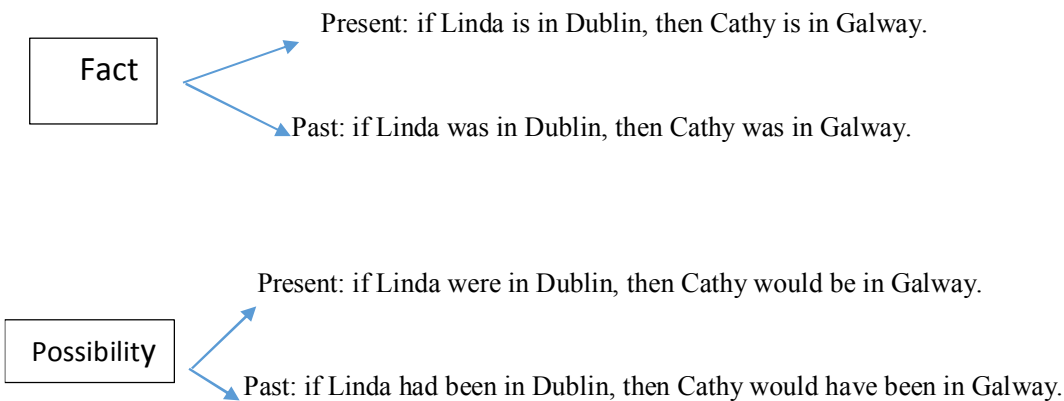
with physical content using functional magnetic resonance imaging. The main finding was a strong activation in the occipital cortex in the counterfactual conditional, and left temporal activation in hypothetical condition. In both experiments left pre-central regions activation was observed, but a medial cluster in the supplementary motor area was elicited by counterfactual only.

DUAL MEANING

However counterfactual meaning is not so simple. One important feature of counterfactuals is their dual meaning. Counterfactuals convey a dual representation. (Fauconnier 1994, De veg, Urrutia & Riffo, 2007). It means that people think about some ideas by keeping in mind two possibilities that effect their way of thinking in many situations. For example suppose a counterfactual conditional statement: " *if Mike had left at 9 a.m. then he would have caught the airplane*. You may think initially about two possibilities; the conjecture, "*Mark left at 9 a.m. and he caught the airplane*, and the presupposed facts, "*Mark didn't leave at 9 a.m. and he didn't catch the airplane*. Suppose you then discover that *Mark didn't catch the airplane*, then you are able to infer that *Mark didn't leave at 9 a.m.* Again suppose you discover that *Mark left at 9 a.m.* then you are able to infer that *Mark caught the airplane.* (Byrne, R.M.J, 2007).

The dual meaning of counterfactuals has been explored empirically in the field of conditional reasoning. [Byrne 2002,2007, Johnson-Larid &Byrne 2002, Santamaria, Espino & Byrne 2005, Thompson & Byrne 2002].

Byrne & Tasso (1999) classified conditionals into present and past fact and possibility:



They compared reasoners' inferences from conditionals based on possibilities in the present or past with their inferences based on facts in the presents or the past. They suggested that based on model theory reasoners make models of conditionals based on possibilities that are similar to but more explicit than their models of conditionals based on facts. Reasoners tended to construct more MT & DA inferences from a present and past possibility, namely nonfactual and counterfactual conditional than a present or past fact, namely factual. But the frequency of MP & AC inferences was same for conditionals based on facts and possibilities. Also experiments' were supportive of their prediction that reasoners understand a counterfactual conditional by representing the hypothesized case and a factual case. In contrast for a factual conditional only the hypothesized case was represented in reasoners initial models. For nonfactuals people constructed a more explicit initial set of the models, and like counterfactuals they represented the presupposed factual situation as well as hypothesized situation.

Thompson & Byrne (2002) investigated the relationship between reasoners' understanding of subjunctive conditionals and the inferences they were prepared to make. Reasoners who made a counterfactual inferences were more likely to a) judge the situation in which p & q occurred to be inconsistent with the conditional statement and b) make negative inferences such as modes tollens "not therefore not q".

Byrne and Egan (2004) considered prefactual possibilities in the future "*if water were discovered on mars in the future, then people would inhabit the planet one day*" and counterfactual conditionals. The result showed that people understand the prefactual by keeping in mind a single possibility the same as factual conditionals. But they understand counterfactuals by keeping in mind two possibilities, the conjecture and the presupposed fact.

De Vega, Urrutia, & Rizzo (2007) study aimed to explore how updating process are modified when counterfactual contents are embedded in narratives. Readers were given factual or counterfactual contexts followed immediately by a final sentences related to one of the contexts. It showed that readers of counterfactual stories read non updated old situation faster than updated new situations. Also information belonging to the initial part of the story became less accessible after reading factual event but highly accessible after counterfactual events. In fact it showed that after reading a counterfactual a double representation is built, the "p & q" meaning, and the "not p & not q" meaning.

De Vega & Urrutia (2012) in an online method explored the temporal course of discourse updating after reading counterfactual events. The results showed that 500 ms after reading initial events in counterfactual format, those initial events were more accessible than after reading same critical event in factual format, suggesting that discourse updating occurred in factual but not in counterfactuals. In sum, the realistic meaning of counterfactuals prevents discourse updating.

Urrutia, De Vega, Bastiaansen (2012) in their study recorded participants' EEG while they read target sentences embedded in counterfactual or factual narratives. The recorded ERPS showed larger negativity after factuals' initial situation than after counterfactuals initial situation, suggesting the fact that the counterfactuals presupposition "not p & not q" prevents updating the here and now of the discourse. By contrast continuation sentences related to the new situation elicited similar ERPS under both factual and counterfactual contexts, suggesting that counterfactuals also activate momentarily an alternative "as if" meaning. However the reduction of gamma power following counterfactuals suggested that the "as if" meaning is not integrated into the discourse, nor does it contribute to semantic unification processes.

Kulakova, Aichhorn, Schurz, Kronbichler, & Perner (2013) using an fMRI investigation compared conditionals in subjunctive mood to conditionals in indicative mood. The result showed activation in right occipital cortex and right basal ganglia during counterfactual sentences processing. Therefore results reflected the fact that counterfactual conditionals pragmatically imply the relevance of keeping in mind both factual and supposed information whereas hypothetical conditionals imply that the real world information is irrelevant for processing the conditionals and can be omitted. The need to keep representation of factual and suppositional events during counterfactual sentences processing requires increased mental imaginary and integration efforts. These results were supported by mental model theory.

A study conducted by Santamaria, Espino, & Byrne (2005) examined in 3 experiments the comprehension of counterfactuals and semifactuals "*Even if it had rained, the plants would have bloomed*" compared with factual conditionals. The results revealed that a) people read the negative conjunction "not p & not q" faster when it was primed by a counterfactual than a factual conditional. b) They read an affirmative conjunction "p & q" equally quickly when it was primed by either conditional types. c) People read the negated-antecedent conjunction "not p & not q" faster when it was primed by semifactual conditionals.

METHOD

PARTICIPANTS

The participants were 68 EFL learners from Sokufa, Shokuh, Sorayesh and Farhikhteh English language centers, Abhar, Iran. There were 45 female and 23 male learners. Their age ranged from 17- 31. Based

on language center's placement test advanced level learners were selected for the study, since they had homogeneous proficiency level no proficiency test was needed.

INSTRUMENT

To conduct present study, a consistency judgment test adopted from Thompson- Byrne (2002) was used. In the original version of the test participants were presented a conditional statement followed by four sentences corresponded to the TA- TC, TA- FC, FA- TC, and FA- FC combinations were asked to determine which combinations of events in would be consistent with the conditional and which ones would be inconsistent. The order in which these sentences were presented was randomized and following each sentences there were two options "consistent" and "inconsistent" and participants were instructed to circle the appropriate option for each combination of event.

The present study was constructed of seven problems while each problem was started by a context statement in order to provide a setting for following conditional sentence. Conditionals were presented in three parts (part A, part B, and part C) and two moods: indicative versus subjunctive and past or past perfect tense. Therefore conditionals in part A were factual conditionals indicative mood and present or past tense, Part B nonfactual conditionals in subjunctive mood and past tense, part C counterfactual conditionals in subjunctive mood and past perfect tense. It worth noting that indicative mood conditionals either in past or present tense are considered factials. Then four choices of TA- TC, TA- FC, FA- TC, and FA- FC, combinations were presented to determine participants' comprehension of each conditional type. These four sentences were randomized for each part and following them there were two options "consistent" and "inconsistent" and participants were instructed to circle the appropriate option for each combination of event.

Procedure

To gather the required data to answer the research question of the present study the procedure was conducted in a way that participants were given a test consisted of seven problems, each problem having three parts composed of three conditional types. The instruction for the tasks asked participants to circle the appropriate options following each choice to demonstrate how they interpreted the conditional statements. Also it worth noting that the instruction asked participants to read the procedure carefully before circling the options and to take as much time as they needed.

The participant were supposed to judge the consistency or inconsistency of interpretations following each conditional. As conducted by Byrne and Tasso (2002) factual conditionals in past or present tense and indicative mood were supposed to be presented by TA-TC. Also conditionals in past or past perfect tense and subjunctive mood were supposed to be presented by FA- FC. Therefore in part A, the interpretation of TA- TC combination would be consistent with the factual conditional and the other three combinations would be inconsistent. In part B, FA_ FC combination would be consistent with the nonfactual conditionals' interpretation and three other combinations would be considered inconsistent. Also in part C, FA- FC combination would be consistent with the counterfactual conditionals' interpretation and other three combinations would be considered inconsistent.

DATA ANALYSIS

The data gathered in the study were analyzed by using the third edition of the statistical package, SPSS program including descriptive statistics of frequency and percentage, Pearson correlations, multivariate ANOVA (MANOVA), and post-hoc comparison tests were used.

RESULTS

The main purpose of this study was to investigate how conditionals in indicative mood and past or present tense (factual conditionals), subjunctive mood and past tense (nonfactual conditionals) or past perfect tense (counterfactual conditionals) are treated by Iranian EFL learners. This chapter presents the

descriptive and test statistics in tables and graphs. It also includes the discussion of findings of this study in the light of relevant literature.

As mentioned in chapter one of this study, the following research questions were proposed with the purpose of achieving the objectives of the study:

RQ1: How conditionals in indicative mood and past or present tense (factual conditionals) are treated by Iranian EFL learners?

RQ2: How conditionals in subjunctive mood and past tense (nonfactual conditionals) are treated by Iranian EFL learners?

RQ3: How conditionals in subjunctive mood and past perfect tense (counterfactual conditionals) are treated by Iranian EFL learners?

And based on the above research questions, the following null hypotheses were stated:

H01: Conditionals in indicative mood, regardless of their temporal perspectives are not represented by TA-TC by Iranian EFL learners.

H02: Conditionals in subjunctive mood and past tense (nonfactual conditionals), are not represented by FA-FC by Iranian EFL learners.

H03: Conditionals in subjunctive mood and past perfect tense (counterfactual conditionals), are not represented by FA-FC by Iranian EFL learners.

Reliability Statistics

In order to assess the reliability index for conditional test that was used in this study, a group of 25 EFL learners who had similar characteristics to the main sample of the study took part in the piloting stage. The results as shown in Table 4.1, indicated that the reliability of final version of the test, composed of 84 items, was assessed 0.82 using Cronbach Alpha which is good indicator of internal consistency.

Table 4.1
Reliability Statistics of Conditional test

Test	No. of Items	Method	Reliability index
Conditional test	84	Cronbach Alpha	0.82

Analysis of the First Research Question

The first research question of this study sought to find out how conditionals in indicative mood and past or present tense (factual conditionals) are treated by Iranian EFL learners. In order to answer this research question a repeated measures one-way ANOVA was used. Table 4.2 contains the results of the descriptive statistics for four event combination types in factual conditionals. Table 4.2 shows that the highest mean score is for TA-TC ($\bar{x} = 6.26$, $SD = 1.70$), and the lowest is for FA-FC ($\bar{x} = 5.03$, $SD = 2.38$).

Table 4.2
Descriptive Statistics for Four Event Combinations in Factual Conditionals

Combination Type	<i>N</i>	Mean	<i>SD</i>
TA-TC	68	6.26	1.707
FA-FC	68	5.03	2.388
TA-FC	68	5.87	1.908
FA-TC	68	5.60	2.325

RM one-way ANOVA was used to see whether these mean differences are statistically significant or not; the results of which are provided in Table 4.3.

Table 4.3
Test of Within Subjects Effects RM ANOVA for Event Combinations in Conditionals

Source	Type III Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>Sig.</i>	Partial Eta Squared	
Combination Type	Sphericity Assumed	54.794	3	18.265	7.091	.000	.096
	Greenhouse-Geisser	54.794	2.007	27.302	7.091	.001	.096
	Huynh-Feldt	54.794	2.069	26.482	7.091	.001	.096
	Lower-bound	54.794	1.000	54.794	7.091	.010	.096

Based on Table 4.3., Greenhouse-Geisser correction indicates that the mean score differences for four types of event combinations are statistically significant ($F = 7.09, p < .01$). Therefore we can claim that Iranian EFL learners interpret conditionals in indicative mood and past or present tense (factual conditionals) differently. Multivariate tests for the RM ANOVA (Table 4.4) further verify this result.

Table 4.4

Multivariate Tests^b RM ANOVA for Event Combinations in Factual Conditionals

Effect		Value	<i>F</i>	Hypothesis <i>df</i>	Error <i>df</i>	<i>Sig.</i>	Partial Eta Squared
Factor	Pillai's Trace	.258	7.525 ^a	3.000	65.000	.000	.258
	Wilks' Lambda	.742	7.525 ^a	3.000	65.000	.000	.258
	Hotelling's Trace	.347	7.525 ^a	3.000	65.000	.000	.258
	Roy's Largest Root	.347	7.525 ^a	3.000	65.000	.000	.258

a. Exact statistic

b. Design: Intercept

Within Subjects Design: Combination Type

As it can be seen in Table 4.4 above (multivariate tests), the partial eta square index is .25, which indicates that 25 percent of the variance in the event combination scores is due to indicative mood conditional. This is a moderate effect size (.25 > .138). The attained results for Wilks' Lambda ($F_{(3,65)} = 7.52, p < .01$) shows that indicative mood conditional influences EFL learners' interpretation significantly. In order to specify the meaningful differences, pair wise comparisons were made (Table 4.5).

Table 4.5

Pair Wise Comparison on Different Event Combinations in Factual Conditionals

(I) Factor	(J) Factor	Mean Difference (I-J)	Sig. ^a	95% Confidence Interval for Difference ^a	
				Lower Bound	Upper Bound
	FA-FC	1.235*	.000	.585	1.886
TA-TC	TA-FC	.397*	.011	.095	.699
	FA-TC	.662*	.002	.251	1.073
FA-FC	TA-FC	-.838*	.019	-1.536	-.140
	FA-TC	-.574	.077	-1.211	.064
TA-FC	FA-TC	.265	.278	-.219	.748

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Table 4.5 above shows that the mean interpretation score for TA-TC event combination ($\bar{x} = 6.26$) is significantly different from all other three types of event combinations i.e., FA-FC ($\bar{x} = 5.03$), $p = .000$, $p < .01$, TA-FC ($\bar{x} = 5.87$), $p = .01$, $p < .05$, FA-TC ($\bar{x} = 5.60$), $p = .002$, $p < .01$. As a result, the first null hypothesis that conditionals in indicative mood, regardless of their temporal perspectives are not represented by TA-TC by Iranian EFL learners is rejected. In other words, we can claim that conditionals in indicative mood, regardless of their temporal perspectives are represented by TA-TC by Iranian EFL learners.

In addition, as represented in Table 4.5, pair wise comparison revealed that there was a significant difference between FA-FC and TA-FC ($p = .01$, $p < .05$), but not between FA-FC and FA-TC ($p = .07$, $p > .05$), not between TA-FC and FA-TC ($p = .27$, $p > .05$).

Figure 4.1 shows the mean differences across the four event combination types. As obvious in Figure 4.1, the largest mean score is for TA-TC ($\bar{x} = 6.26$), followed by the TA-FC ($\bar{x} = 5.87$), FA-TC ($\bar{x} = 5.60$) and then the FA-FC ($\bar{x} = 5.03$).

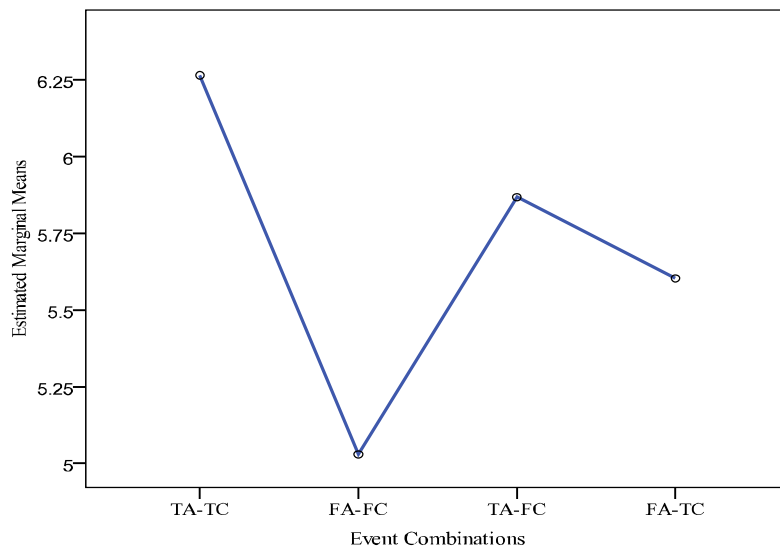


Figure 4.1 Event combination means in factual conditionals

Analysis of the Second Research Question

The aim of the second research question of this study was to know how conditionals in subjunctive mood and past tense (nonfactual conditionals) are treated by Iranian EFL learners. A repeated measure one-way ANOVA was used to investigate the second research question. The results of the descriptive statistics for four event combination types in nonfactual conditionals are set forth in Table 4.6. As evident from Table 4.6, FA-FC has the largest mean score ($\bar{x} = 6.29$, $SD = 1.74$), and FA-TC ($\bar{x} = 4.90$, $SD = 2.66$) is the smallest.

Table 4.6
Descriptive Statistics for Four Event Combinations in Nonfactual Conditionals

Combination Type	<i>N</i>	Mean	<i>SD</i>
TA-TC	68	6.06	1.900
FA-FC	68	6.29	1.745
TA-FC	68	5.82	2.266
FA-TC	68	4.90	2.666

With the intention testing whether these mean differences are statistically significant or not RM one-way ANOVA was conducted; the results of which are laid out in Table 4.7.

Table 4.7
Test of Within Subjects Effects RM ANOVA for Event Combinations in Nonfactual Conditionals

Source	Type III Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>Sig.</i>	Partial Eta Squared	
Combination Type	Sphericity Assumed	76.364	3	25.455	10.034	.000	.130
	Greenhouse-Geisser	76.364	1.602	47.660	10.034	.000	.130
	Huynh-Feldt	76.364	1.635	46.693	10.034	.000	.130
	Lower-bound	76.364	1.000	76.364	10.034	.002	.130

As appeared in Table 4.7, Greenhouse-Geisser correction shows that the mean score differences for four types of event combinations in nonfactual conditionals are statistically significant ($F = 10.03, p < .01$). Thus we can conclude that Iranian EFL learners interpret conditionals in subjunctive mood and present tense (nonfactual conditionals) differently. To confirm this results, multivariate tests for the RM ANOVA (Table 4.8) was prepared.

Table 4.8

Multivariate Tests^b RM ANOVA for Event Combinations in Nonfactual Conditionals

Effect		Value	<i>F</i>	Hypothesis <i>df</i>	Error <i>df</i>	<i>Sig.</i>	Partial Squared	Eta Squared
Factor	Pillai's Trace	.198	5.336 ^a	3.000	65.000	.002	.198	
	Wilks' Lambda	.802	5.336 ^a	3.000	65.000	.002	.198	
	Hotelling's Trace	.246	5.336 ^a	3.000	65.000	.002	.198	
	Roy's Largest Root	.246	5.336 ^a	3.000	65.000	.002	.198	

a. Exact statistic

b. Design: Intercept

Within Subjects Design: Combination Type

Table 4.8 above (multivariate tests) reflects that the partial eta square index is .19, which shows that 19 percent of the variance in the event combination scores is because of subjunctive mood conditional. This is a moderate effect size (.25 > .138). The obtained results for Wilks' Lambda ($F_{(3, 65)} = 5.33, p < .01$) shows that subjunctive mood nonfactual conditional affects EFL learners' interpretation significantly. Pair wise comparisons were made (Table 4.9) so as to identify the meaningful differences.

Table 4.9

Pair Wise Comparison on Different Event Combinations in Nonfactual Conditionals

(I) Factor	(J) Factor	Mean Difference (I-J)	Sig. ^a	95% Confidence Interval for Difference ^a	
				Lower Bound	Upper Bound
FA-FC	TA-TC	.235*	.017	.043	.427
	TA-FC	.471*	.018	.082	.859
	FA-TC	1.397*	.000	.667	2.128
TA-TC	TA-FC	.235	.222	-.146	.617
	FA-TC	1.162*	.001	.473	1.851
TA-FC	FA-TC	.926*	.007	-1.591	-.262

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

A quick look at Table 4.9 above hands on that the mean interpretation score for FA-FC event combination ($\bar{x} = 6.29$) is significantly different from all other three types of event combinations i.e., TA-TC ($\bar{x} = 6.06$), $p = .01$, $p < .05$, TA-FC ($\bar{x} = 5.82$), $p = .01$, $p < .05$, FA-TC ($\bar{x} = 4.90$), $p = .000$, $p < .01$. Consequently, the second null hypothesis as conditionals in subjunctive mood and past tense (nonfactual conditionals), are not represented by FA-FC by Iranian EFL learners is rejected. Therefore we can claim that conditionals in subjunctive mood and past tense (nonfactual conditionals), perspectives are represented by FA-FC by Iranian EFL learners.

Besides, Table 4.9 that there was a significant difference between TA-TC and FA-TC ($p = .001$, $p < .01$), and TA-FC and FA-TC ($p = .007$, $p < .01$) but not between TA-TC AND TA-FC ($p = .22$, $p > .05$).

A line chart (Figure 4.2) was drawn to demonstrate the mean differences across the four event combination types shows. As Figure 4.2 shows, FA-FC ($\bar{x} = 6.29$) has the highest mean score, followed by the TA-TC ($\bar{x} = 6.06$), TA-FC ($\bar{x} = 5.82$) and then the FA-TC ($\bar{x} = 4.90$).

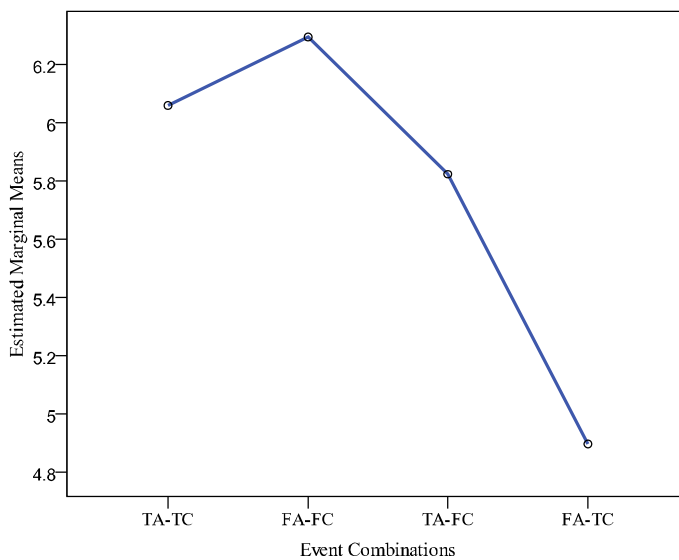


Figure 4.2 Event combination means in nonfactual conditionals

Analysis of the Third Research Question

The third research question of the current study aimed at learning how conditionals in subjunctive mood and past perfect tense (counterfactual conditionals) are treated by Iranian EFL learners. To answer this research question a repeated measures one-way ANOVA was applied. Table 4.1 displays the results of the descriptive statistics for four event combination types in counterfactual conditionals. As evident from Table 4.10, the highest mean score is for FA-FC ($\bar{x} = 6.26$, $SD = 1.78$), and the lowest is for FA-TC ($\bar{x} = 5.37$, $SD = 2.25$).

Table 4.10

Descriptive Statistics for Four Event Combinations in Counterfactual Conditionals

Combination Type	<i>N</i>	Mean	<i>SD</i>
TA-TC	68	5.93	1.624
FA-FC	68	6.26	1.784
TA-FC	68	5.82	2.212
FA-TC	68	5.37	2.259

RM one-way ANOVA was performed to examine whether these mean differences are statistically significant or not. Table 4.11 represents the results of this analysis.

Table 4.11

Test of Within Subjects Effects RM ANOVA for Event Combinations in Counterfactual Conditionals

Source	Type III Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>Sig.</i>	Partial Eta Squared	
Combination Type	Sphericity Assumed	27.956	3	9.319	4.157	.007	.058
	Greenhouse-Geisser	27.956	1.912	14.620	4.157	.019	.058
	Huynh-Feldt	27.956	1.967	14.212	4.157	.018	.058
	Lower-bound	27.956	1.000	27.956	4.157	.045	.058

Greenhouse-Geisser correction (Table 4.11) indicates that the mean score differences for four types of event combinations are statistically significant ($F = 4.15, p < .05$). Therefore we can conclude that Iranian EFL learners interpret conditionals in subjunctive mood and past perfect tense (counterfactual conditionals) differently. Multivariate tests for the RM ANOVA (Table 4.12) further confirm this result.

Table 4.12

Multivariate Tests^b RM ANOVA for Event Combinations in Counterfactual Conditionals

Effect		Value	<i>F</i>	Hypothesis <i>df</i>	Error <i>df</i>	<i>Sig.</i>	Partial Squared	Eta
Factor	Pillai's Trace	.168	4.363 ^a	3.000	65.000	.007	.168	
	Wilks' Lambda	.832	4.363 ^a	3.000	65.000	.007	.168	
	Hotelling's Trace	.201	4.363 ^a	3.000	65.000	.007	.168	
	Roy's Largest Root	.201	4.363 ^a	3.000	65.000	.007	.168	

a. Exact statistic

b. Design: Intercept

Within Subjects Design: Combination Type

Table 4.12 above (multivariate tests) reflects that the partial eta square value is .16, which indicates that 16 percent of the variance in the event combination scores is due to subjunctive mood and past perfect tense (counterfactual conditionals). This amount of effect size is moderate (.16 > .138). The gained results for Wilks' Lambda ($F_{(3, 65)} = 4.36, p < .01$) indicates that subjunctive mood and past perfect tense influences EFL learners' interpretation significantly. With the aim of locating the meaningful differences, pair wise comparisons were prepared (Table 4.13).

Table 4.13

Pair Wise Comparison on Different Event Combinations in Counterfactual Conditionals

(I) Factor	(J) Factor	Mean Difference (I-J)	Sig. ^a	95% Confidence Interval for Difference ^a	
				Lower Bound	Upper Bound
	TA-TC	.338*	.145	.022	.050
FA-FC	TA-FC	.441*	.175	.014	.093
	FA-TC	.897*	.319	.006	.260
TA-TC	TA-FC	.103	.212	.628	-.320
	FA-TC	.559	.319	.084	-.077
TA-FC	FA-TC	.456	.310	.146	-.162

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Table 4.13 above shows that the mean interpretation score for FA-FC event combination ($\bar{x} = 6.26$) is significantly different from all other three types of event combinations i.e., TA-TC ($\bar{x} = 5.93$), $p = .02$, $p < .05$, TA-FC ($\bar{x} = 5.82$), $p = .01$, $p < .05$, FA-TC ($\bar{x} = 5.37$), $p = .006$, $p < .01$. Accordingly, the third null hypothesis that states conditionals in subjunctive mood, are not represented by FA-FC by Iranian EFL learners is rejected. So we can claim that conditionals in subjunctive mood and past perfect tense (counterfactual conditionals), are represented by FA-FC by Iranian EFL learners.

In addition, as represented in Table 4.13, pair wise comparison revealed that there was a significant difference between FA-FC and TA-FC ($p = .01$, $p < .05$), but not between FA-FC and FA-TC ($p = .07$, $p > .05$), not between TA-FC and FA-TC ($p = .27$, $p > .05$).

We made a line chart (Figure 4.3) to show the mean differences across the four event combination types clearly. Figure 4.3 indicates that the largest mean score is for FA-FC ($\bar{x} = 6.26$), followed by the TA-TC ($\bar{x} = 5.93$), TA-FC ($\bar{x} = 5.82$) and then the FA-TC ($\bar{x} = 5.37$).

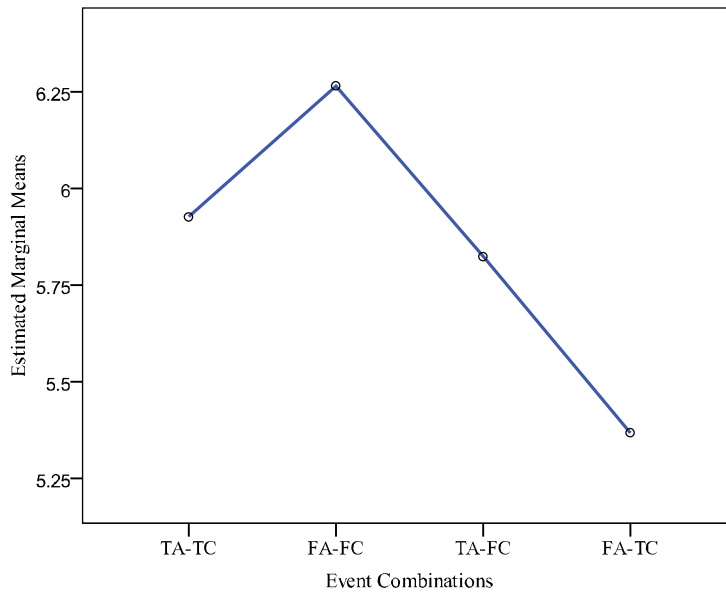


Figure 4.3 Event combination means in counterfactual conditionals

DISCUSSION

As mentioned before, the current investigation focused on the comprehension of factual, nonfactual and counterfactual conditionals by Iranian EFL learners advocating mental model theory of conditional reasoning in that it can represent model about real, hypothetical, or imaginary situations. Through using the third edition of SPSS computer software package, it was sought to answer research questions. The data presented in the preceding chapter will be discussed according to the research questions formulated for this study:

How conditionals in indicative mood and past or present tense (factual conditionals) are treated by Iranian EFL learners?

How conditionals in subjunctive mood and past tense (nonfactual conditionals) are treated by Iranian EFL learners?

How conditionals in subjunctive mood and past perfect tense (counterfactual conditionals) are treated by Iranian EFL learners?

Question 1: How conditionals in indicative mood and past or present tense (factual conditionals) are treated by Iranian EFL learners?

As mentioned in section 2.6.1 of the present study factual conditionals (conditionals type 1 and zero type conditionals) are possible and likely to fulfill, that why we hypothesized that representation of indicative conditionals by Iranian EFL learners contains only the TA-TC combination. As expected result obtained in this study showed that indicative conditionals were more likely than subjunctive conditionals interpreted by TA-TC. Participants given indicative conditionals appeared to believe that these conditionals implied something about the truth or falsity of their propositions. Participants were more likely to perceive that indicative conditionals were consistent with the truth of antecedent and consequent.

This result was in line with findings of Thompson and Byrne (2002) in that conditionals based on facts in indicative mood and past or present tense i.e. factual conditionals would be considered as TA-TC, and participants given a factual conditional would be more likely to consider FA-FC combination to contradict the conditional. Therefore FA-FC combination should be perceived as inconsistent.

Also the result was/is in line with Schaecken, Schroyens, Dieussuert (2001) in that there were no large differences between conditionals in indicative mood and present tense, with conditionals in indicative mood and past tense.

Question 2 & 3: How conditionals in subjunctive mood and past tense (nonfactual conditionals) and conditionals in subjunctive mood and past perfect tense (counterfactual conditionals) are treated by Iranian EFL learners?

It worth noting that in subjunctive mood in contrary to indicative mood, tense aspect is a determining factor in classifying different conditional type i.e. conditionals in subjunctive mood and past tense are called nonfactual conditionals, and conditionals in subjunctive mood and past perfect tense are called counterfactual conditionals. Although in subjunctive mood there are two different conditional types, we hypothesized that these two conditional types regardless of their temporal perspective are represented by FA-FC by Iranian EFL learners. As Byrne (1997) counterfactuals seem to be understood differently from factual conditionals.

Although very little was found in literature on the question of the present study, the result is in line with Thompson and Byrne (2002) in that in conditionals based on possibility in subjunctive mood and past tense i.e. counterfactuals, TA-TC combination would contradict the conditional. In other word since participants assume that the conditional is consistent with FA-FC combination and implies the falsity of antecedent and consequent, they would consider the occurrence of antecedent and consequent (TA-TC) to be inconsistent with the conditional.

In reviewing the literature, no specific study was found on nonfactual conditionals but the finding of this study is in line with Byrne and Tasso (1999) in that nonfactual and counterfactual conditionals are treated equally, and that subjunctive conditionals somehow mean different from their corresponding indicative conditionals, that's why progress in understanding them has been slow.

Conclusion

Returning to the hypothesis and questions posed at the beginning of this study on comprehension of different conditionals, the findings of the study confirm that although mood and tense are determining factors in classifying different conditional types, it worth noting that in each mood, tense aspect cannot differentiate interpretation of each conditional type. As mentioned earlier conditionals in indicative mood, either in past or present tense, are called factual conditionals, and are represented by TA-TC i.e. true antecedent and consequent by Iranian EFL learners.

Also in subjunctive mood, both present tense conditionals (nonfactuals) and past tense conditionals (counterfactuals) are represented by FA-FC i.e. falsity of their antecedent and consequent by Iranian EFL learners.

As Schaeken, Schroyens, and Diessuaert (2001) mental model theory of conditional reasoning is a semantic process in which individuals build model of situation under description. They also claimed that in a process of reasoning first the premises are understood then a mental model of situation is constructed based on their meaning and general knowledge. Then on the basis of that model a conclusion is drawn that conveys some information that was not explicitly asserted by the premises.

Therefore when encountering a factual conditional having a general knowledge that it is real, possible and very likely to fulfill, one builds a mental model of its premises in a way that this conditional implies something about the truth or falsity of its propositions. One is more likely to perceive that indicative conditional is consistent with the truth of antecedent and consequent.

As Johnson-Larid, & Byrne (2002) a counterfactual possibility refers to a situation that once was a factual possibility but that didn't occur. That's why, when encountering a nonfactual or counterfactual conditional having a general knowledge that it is very unlikely or impossible to fulfill, one builds a mental model of its premises in a way that this conditional implies something about the truth or falsity of its propositions. One is more likely to perceive that subjunctive conditional is consistent with the falsity of antecedent and consequent.

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