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Conditional advice and inducements: are readers sensitive to implicit speech acts during comprehension?

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Abstract

Conditionals can implicitly convey a range of speech acts including promises, tips, threats and warnings. These are traditionally divided into the broader categories of advice (tips and warnings) and inducements (promises and threats). One consequence of this distinction is that speech acts from within the same category should be harder to differentiate than those from different categories. We examined this in two self-paced reading experiments. Experiment 1 revealed a *rapid* processing penalty when inducements (promises) and advice (tips) were anaphorically referenced using a mismatching speech act. In Experiment 2 a *delayed* penalty was observed when a speech act (promise or threat) was referenced by a mismatching speech act from the same category of inducements. This suggests that speech acts from the same category are harder to discriminate than those from different categories. Our findings support a semantic distinction between speech act categories, but also reveal pragmatic differences within categories.

1.1 Introduction

In everyday life, much information is communicated using the conditional form *if p then q*. For example, you might read "*if you want to lose weight, you need to exercise more*", or you might tell your child "*if you wash the car, I'll pay you five pounds*". Alternatively, you may be advised "*if you travel to Thailand, beware of pickpockets*" or overhear an employee being told "*if you're late again, I'll fire you*". Although these statements each follow the general conditional form, they implicitly convey different speech acts. The first communicates a tip, the second a promise, the third a warning and the fourth a threat. The purpose of the experiments reported below is to examine whether readers are sensitive during comprehension to the differing pragmatic functions associated with conditional statements that implicitly communicate different kinds of speech act.

The vast majority of psychological research on conditionals to date has been from a reasoning and decision making perspective (e.g., Evans & Over, 2004; Johnson-Laird & Byrne, 2002). A traditional view from this standpoint is that conditionals simply assert a logical proposition. However, conditional statements in everyday discourse are often used pragmatically to perform speech acts (Searle, 1969). These speech acts can be communicated explicitly (e.g., if you wash the car, I *promise* to pay you five pounds) or implicitly by omitting the performative verb (e.g., if you wash the car, I'll pay you five pounds). In the latter case, the listener must infer the speaker's intent.

Failure to make this inference and accurately discriminate between speech acts can have serious consequences. For example, a patient reading the conditional advice "*If you choose treatment X, then your quality of life will improve*" could misinterpret this statement (a tip) as a promise. This seemingly trivial error is potentially dangerous as promises presuppose a stronger causal relationship between antecedent and consequent than a tip, and are therefore likely to induce the stated action to a greater degree than the author might intend (Ohm & Thompson, 2004). For this reason it is important to understand exactly how everyday conditional speech acts are represented during comprehension.

Within the domain of experimental psychology, a pragmatics-focused view on conditionals has recently been adopted (e.g., Bonnefon, 2009; Evans, Neilens, Handley,

& Over, 2008; Johnson-Laird & Byrne, 2002). One fundamental line of research has sought to determine how people classify and discriminate between the pragmatic functions of conditional statements. In an initial attempt to model how people classify conditionals López-Rousseau and Ketelaar (2004) presented a simple two-stage *pragmatic cues algorithm* that successfully categorised over 85% of conditional speech acts as a function of speaker's control of the consequent and utility for the listener. A revision of this algorithm (López-Rousseau & Ketelaar, 2006) which included the superordinate categories of advice and inducement (following a traditional distinction in research on pragmatic conditionals) successfully categorised 92% of conditional promises, threats, tips and warnings (see Fig. 1).

****FIGURE 1 ABOUT HERE****

In an effort to formalise the unique properties of *all* pragmatic conditionals Bonnefon (2009) developed a utility grid system that represents the utility of the antecedent and consequent events for both the speaker and listener. Following the algorithm developed by López-Rousseau and Ketelaar (2006), the utility grids for promises and tips specify a possible action (q) that has positive utility for the listener. Crucially, if q is a potential action of the speaker, then it is a promise; but if q is not a potential action of the speaker, then it is a tip. Likewise, threats and warnings describe a possible action (q) that has negative utility for the listener. In this case, if q is a potential action of the speaker, it is threat; but if q is not a potential action of the speaker, then it is a warning.

These utility grids suggest that successful comprehension requires sensitivity to a range of pragmatic factors. However, it is not clear how people mentally represent these pragmatic relationships as they process conditionals in real time. Indeed, the vast majority of research into conditionals is based on analysis of the final, fully-formed, interpretation of a statement, rather than the incremental real-time processes that lead to this conclusion (see Stewart, Haigh & Kidd, 2009 for an exception). A key aim of the

experiments presented below is to determine how conditional speech acts form part of a reader's semantic representation of the utterance during comprehension.

While there is evidence that readers routinely represent a number of common speech acts online (e.g., request, remind, apology etc.; Holtgraves, 2008), studies focusing on conditional speech acts have been restricted to offline rating and deduction tasks (e.g., Evans et al., 2008; Newstead, Ellis, Evans, & Dennis, 1997). These studies, in combination with recent theoretical perspectives (e.g., Bonnefon, 2009; Evans, 2005; López-Rousseau & Ketelaar, 2006) suggest that conditional promises, tips, threats and warnings can be categorised and represented in one of two ways. Firstly, they can be represented at the semantically coarse grained level of the speech act category (i.e., inducement or advice). This is equivalent to stopping at Stage 1 in the pragmatic cues algorithm. Alternatively, they can be represented at the semantically finer grained level of the specific speech act itself, which is equivalent to completing both stages of the algorithm.

One consequence of this distinction relevant to online processing is that it might be more cognitively efficient to represent a conditional in terms of its broad speech act category (as this only requires the operation one step in the algorithm) than to represent the specific speech act itself (which requires both steps). This would be consistent with the recent view that many aspects of comprehension involve cognitively efficient processing that often results in an underspecified semantic representation (e.g., Sanford & Graesser, 2006). A second consequence is that speech acts from different categories should be easier to differentiate than those from the same category. In other words, it should be more difficult to discriminate between a promise and a threat (both inducements) than to discriminate between a promise and a tip (which come from different categories).

Determining the level of representation that readers engage in during comprehension is crucial, as a coarse-grained representation could lead to speech acts being misinterpreted and influencing behaviour in unintended ways. At present nothing is known about the degree of pragmatic information that is accessed during the online processing of conditional information. The experiments below examine how and when readers discriminate between speech acts during online comprehension. Firstly,

Experiment 1 looks at readers' sensitivity to the broad distinction between the speech act categories of inducement and advice.

2.1 Experiment 1

In the word-by-word self paced reading experiment below we presented participants with a number of implicit conditional speech acts (tips and promises) embedded in short vignettes. These speech acts were then anaphorically referenced using either a matching or mismatching speech act noun (e.g., 'this tip…' or 'this promise…').

<u>Example item</u>

Chris was looking to a buy a new car. After spending all day in car dealerships he had decided to make an offer on a second hand Audi. The dealer had earlier said "if you buy the car, I'll give you 12 months free insurance." / The dealer had earlier said "if you buy the car, make sure you negotiate with the insurance company for the best deal." This was a useful promise/tip that could save him money. After half an hour of haggling they agreed a deal on the car.

Since promises and tips come from different speech act categories (inducements and advice respectively) a mismatching anaphoric reference violates the first step of the pragmatic cues algorithm because promises and tips have a different locus of control. It is well established that mismatching anaphoric references cause a processing penalty during comprehension compared to when the anaphor and antecedent match (e.g., Stewart, Pickering & Sanford, 2000). This processing penalty also occurs for much smaller semantic mismatches, such as when the anaphor is an atypical example of a semantic category (e.g., 'goose' is atypical of the semantic category 'bird'; Garrod & Sanford, 1977). Therefore, if a reading time penalty is observed on or following the revealed speech act noun when the anaphor and antecedent mismatch (relative to when they match), it will suggest that readers are sensitive to the broad distinction between inducements and advice.

2.1.1 Design

Participants read conditionals embedded in short vignettes. Each conditional indirectly communicated either a promise or a tip. Following each conditional, a target sentence contained an anaphoric reference that named the implied speech act as either a 'tip' or a 'promise'. This reference either matched or mismatched the implied meaning of the preceding conditional, allowing us to compare reading times for identical regions of text across conditions. For example, we could compare reading times to the anaphor 'promise' following either an implied promise (matching) or an implied tip (mismatching) or similarly measure reading times to the anaphor 'tip' following an implied tip (matching) or implied promise (mismatching) . This resulted in a 2 x 2 (Implied Speech Act x Referenced Speech Act) repeated measures design.

2.1.2 Participants

Thirty two volunteers from the University of Manchester population. All participants were native English speakers and did not have a reading disability. They were each paid £5.

2.1.3 Materials

The conditional statements used in the Experiment were categorised in an offline categorisation task, in which 100 participants categorised 36 speech acts as either a tip, promise, threat or warning. There were two versions of each statement, with one designed to be a tip and one designed to be a promise (split into two lists using a Latin Squares design, each list contained 12 filler items and was rated by 50 participants). Thirty two pairs of statements were retained from the offline categorisation task. Of these statements, those designed as promises were categorised as such by 92% of participants and those designed as tips were categorised as such by 89% of participants.

For the comprehension experiment each statement was embedded within a five-sentence vignette (see above for example. Further representative examples can be found in Appendix A. The full set of items for both experiments can be obtained by contacting the first author). The first two sentences provided context. Sentence three contained the

speech act. Sentence four then revealed the speech act to be either a tip or a promise. Sentence five contained additional contextual information. These passages were used to create four lists using a repeated measures, Latin-square design. Each list also contained 16 filler passages.

2.1.4 Procedure

Participants were informed that they would be presented with a number of passages on a word-by-word basis. To advance through the passages, they pressed the space bar. Dashes were used to represent the rest of each passage. Only one word was visible at a time. Comprehension questions appeared on 25% of the trials. Participants first completed two practice trials.

2.2 Results

Individual word reading times to the target sentence containing the anaphoric reference were examined to form three analysis regions (see Table 1). Region 1 was the single word corresponding to the Referenced Speech Act (e.g., 'tip' or 'promise') to capture any rapidly occurring sensitivity to the (in)consistency of this reference. Region 2 was the remainder of the target sentence, up to and including the penultimate word. Region 3 was the final word of the target sentence and was intended to capture any sentence wrap up effects (Just & Carpenter, 1980). Two-way repeated measures ANOVAs (Implied Speech Act x Revealed Speech Act) were conducted treating participants (F1) and items (F2) as random factors for each analysis region. These were followed up with planned comparisons using one-tailed t-tests that treated participants (t1) and items (t2) as random factors for each comparison.

****TABLE 1 ABOUT HERE****

2.2.1 Region 1

There were no main effects of Implied Speech Act (both Fs < 1) or Referenced Speech Act (both Fs < 1). Crucially, the interaction between these variables was significant (F1(1, 31) = 4.31, MSE = 4,182, p = .046, η_p^2 = .12; F2(1, 31) = 10.72, MSE = 1,681, p = .003, η_p^2 = .26). This revealed a reading time penalty when the Referenced Speech Act mismatched the Implied Speech Act. Planned comparisons showed that this reading time penalty was symmetrical (i.e., approximately the same effect size for both referenced speech acts): a penalty of 20 msec. merged when the word 'promise' was inappropriately used to describe an implied tip (*t*1(31) = 1.86, p = .037, η_p^2 = .10 *t*2(31) = 1.62, p = .058, η_p^2 = .078), whereas the penalty was 28 msec. when the word 'tip' was inappropriately used to describe an implied promise (*t*1(31) = 1.57, p = .064, η_p^2 = .07; *t*2(31) = 2.6, p = .007; η_p^2 = .18).

2.2.2 Region 2

There were no main effects of Implied Speech Act (both Fs < 1) or Referenced Speech Act (F1 (1, 31) = 2.74, MSE = 39,970, p = .11, η_p^2 = .08; F2 (1, 31) = 1.56, MSE = 69,763, p = .22, η_p^2 = .05) and no interaction between these variables (F1 (1, 31) = 2.64, MSE = 31,417, p = .11, η_p^2 = .08; F2 (1, 31) = 1.49, MSE = 55,668, p = .23, η_p^2 = .05). Planned contrasts that sensitivity to the implied speech act carried over into this region following the inappropriate anaphoric use of the word 'tip' (penalty = 79 msec. *t*1(31) = 1.94, p = .031, η_p^2 = .11; *t*2(31) = 1.37, p = .09, η_p^2 = .06), but no such carryover effect appeared after inappropriate use of the word 'promise' (penalty = 22 msec. t1(31) = .37, p = .36, η_p^2 = .004; t2(31) = .41, p = .34, η_p^2 = .005).

2.2.3 Region 3

There were no main effects of Implied Speech Act (F1 (1, 31) = 1.86, MSE = 17,917, p = .183, η_p^2 = .06; F2 (1, 31) = 1.29, MSE = 28,856, p = .265, η_p^2 = .04), or Referenced Speech Act (F1 (1, 31) = 2.71, MSE = 7,782, p = .11, η_p^2 = .08; F2 (1, 31) = 1.32, MSE = 15,983, p = .26, η_p^2 = .04) and no interaction between these variables (both Fs < 1). Planned contrasts revealed no reading time penalty when the words 'promise' (*t*1(31) =

.91, p = .18, η_p^2 = .03; $t2(31)$ = .989, p = .17, η_p^2 = .03) and 'tip' ($t1(31)$ = 1.2, p = .12, η_p^2 = .045; $t2(31)$ = .88, p = .19, η_p^2 = .02) were inappropriately used as an anaphor.

2.3 Discussion

Analysis of reading times to the explicitly revealed speech (Region 1) act revealed a rapid interaction as a result of the Referenced Speech Act mismatching the Implied Speech Act. This effect was approximately symmetrical for both promises and tips (i.e., the word 'promise' was read 20 msec. faster following an implied promise than following an implied tip and the word 'tip' was read 28 msec. faster following an implied tip than an implied promise). Since tips and promises come from different speech act categories (advice and inducement respectively), the reading time slow down for mismatching anaphoric references provides initial evidence that readers are able to rapidly discriminate between these speech act categories during comprehension. In terms of the pragmatic cues algorithm, these data support the idea that readers are able to use the pragmatic cue of speaker control to rapidly discriminate between inducements and advice.

Interestingly there was also some evidence (significant by participants only) following this initial sensitivity that inappropriate usage of 'tip' as an anaphor continued to disrupt processing into Region 2, whereas the initial effect for promises quickly subsided. In other words participants found it less disruptive to interpret an implied tip as a promise than to interpret an implied promise as a tip. This suggestion of an asymmetrical spill over effect provides some evidence that promises may have a wider pragmatic scope than tips, with the concept of 'promise' overlapping to some extent with the concept of 'tip' but not vice versa. Specifically, when 'promise' was used as an anaphor to describe an implied tip there was less disruption to subsequent processing than when a 'tip' anaphor described an implied promise. This would be consistent with evidence in the conditional reasoning literature that promises tend to be perceived as pragmatically 'stronger' than tips (see Evans, 2005).

While our findings show that readers are rapidly sensitive to the distinction between inducements and advice, these categories mirror a common distinction in the reasoning literature between indicative and deontic reasoning. While conditional advice invites a form of indicative reasoning about possibilities, conditional inducements

inherently require a form of deontic reasoning about permissions and obligations. Several offline deduction studies have noted differences in the way that people reason with indicative and deontic conditionals, with participants tending to draw more inferences (both valid and invalid) from inducement conditionals (Newstead et al., 1997). Given that our materials differed in the mode of reasoning required for comprehension, this contrast may have been reflected in our findings. Therefore, when a mismatching anaphor was processed, the processing penalty may have been caused by a mismatch at the level of the specific speech act (tip vs. promise), the more abstract level of the speech act category (advice vs. inducement), the mode of reasoning that was required (indicative vs. deontic) or any combination of the above.

In Experiment 2 we refined our investigation by examining whether readers represent *specific* speech acts during comprehension in the absence of any mismatch at the levels of speech act category and mode of reasoning. This was achieved by focusing on conditional promises and threats, which both come from the same speech act category (inducements) and communicate a deontic relationship between p and q.

3.1 Experiment 2

Experiment 1 revealed that readers are sensitive to the broad distinction *between* speech act categories. Experiment 2 is identical in design to Experiment 1 but focuses on readers' sensitivity to specific speech acts *within* the same category, by examining the processing of promises and threats (both of which are inducements). To differentiate speech acts at this level of representation *both* stages of the pragmatic cues algorithm must operate. The operation of these two stages may therefore be more cognitively demanding than differentiating between promises and tips (which required the operation of only the first stage). This motivates two competing predictions concerning the onset of any sensitivity. If readers are able to discriminate between speech acts *within* a speech act category as easily as they do for speech acts between categories, then a rapid sensitivity to a mismatching anaphor would be expected (as was found in Experiment 1). However, if conditionals from the same speech act category are pragmatically closer than those from different speech act categories (thus harder to discriminate), then that should involve an extra stage of processing. Any processing cost may then occur at a delay; i.e.,

downstream from the speech act noun itself. This would be consistent with discourse processing studies in which semantically close anomalies (i.e., information that is implausible rather than incongruent) cause a delayed processing penalty (e.g., Rayner, Warren, Juhasz, & Liversedge, 2004; Stewart, Pickering, & Sturt, 2004).

3.1.1 Design & Procedure
The design and procedure were identical to Experiment 1 except that the two levels of each experimental factor were promises and threats rather than promises and tips.

3.1.2 Participants
Twenty four different participants were recruited from the same population as in Experiment 1.

3.1.3 Materials
As with Experiment 1, a series of contextualised promises and threats were rated in an offline categorisation task (n=40). Thirty two pairs of items were retained for use in the comprehension task, with promises rated as such by 81% of participants and threats rated as such by 74% of participants. These conditionals were embedded vignettes (see example and Appendix B).

Example item

John was in a meeting with his project supervisor at university. They were discussing the results of the study for which John was employed as a Research Assistant. John's supervisor said to him "if the results are written by next week, then I will put you on the paper as an author." / John's supervisor said to him "if the results are written later than next week, then I'll take you off the project." John decided based upon this promise/threat that he would make sure the results were completed. He thought he would work on it over the weekend if necessary.

3.2 Results

The three analysis regions were identical to Experiment 1. See Table 2 for means.

****TABLE 2 ABOUT HERE****

3.2.1 Region 1

There were no main effects of Implied Speech Act ($F1$ $(1, 23) = 1.51$, MSE $= 1,943$, $p = .23$, $\eta_p^2 = .62$; $F2 < 1$) or Referenced Speech Act (both $Fs < 1$) and no interaction between these variables (both $Fs < 1$). Planned contrasts revealed no reading time penalties when the words 'promise' ($t1(23) = .34$, p $= .37$, $\eta_p^2 = .005$); $t2(31) = .27$, p $= .40$, $\eta_p^2 = .002$) and 'threat' ($t1(23) = .97$, p $= .17$, $\eta_p^2 = .04$; $t2(31) = 1.0$, p $= .16$, $\eta_p^2 = .03$) were inappropriately used as anaphors.

3.2.2 Region 2

There were no main effects of Implied Speech Act (both $Fs < 1$) or Referenced Speech Act (both $Fs < 1$) and no interaction between these variables ($F1 < 1$; F2 $(1, 31) = 2.56$, MSE $= 112,417$, $p = .12$, $\eta_p^2 = .08$). Planned contrasts revealed no reading time penalties immediately after the words 'promise' ($t1(23) = .28$, p $= .39$, $\eta_p^2 = .003$; $t2(31) = .7$, p $= .24$, $\eta_p^2 = .02$) and 'threat' ($t1(23) = .69$, p $= .25$, $\eta_p^2 = .02$; $t2(31) = 1.7$, p $= .05$, $\eta_p^2 = .09$) were inappropriately used as anaphors.

3.2.3 Region 3

Analysis of variance revealed a main effect of Implied Speech Act by items only ($F1(1, 23) = 2.7$, MSE $= 14,372$, $p = .11$, $\eta_p^2 = .11$; $F2(1, 31) = 4.21$, MSE $= 18,886$ $p = .05$, $\eta_p^2 = .12$) and a significant main effect of Referenced Speech Act ($F1(1, 23) = 12.5$, MSE $= 7,309$, $p = .002$, $\eta_p^2 = .35$; $F2(1, 31) = 4.92$, MSE $= 24,775$, $p = .03$, $\eta_p^2 = .14$). The interaction between Implied Speech Act and Referenced Speech Act was also significant ($F1(1, 23) = 8.40$, MSE $= 10,268$, $p = .01$, $\eta_p^2 = .27$; $F2(1, 31) = 6.09$, MSE $= 18,886$, $p = .02$, $\eta_p^2 = .16$) revealing a reading time penalty when the Referenced Speech Act

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mismatched the Implied Speech Act (relative to when the implied and revealed speech acts matched). Planned comparisons revealed that this penalty was asymmetric, with a significant slowdown of 100 msec. at the end of a sentence that inappropriately described a promise as a threat ($t1(23) = 2.49$, p = .011, $\eta_p^2 = .21$; $t2(31) = 2.72$, p = .006, $\eta_p^2 = .19$), but a non-significant penalty of 20 msec. when a threat was described as a promise ($t1(23) = .950$, p = .18, $\eta_p^2 = .04$; $t2(31) = -.81$, p = .21; $\eta_p^2 = .02$).

3.3 Discussion

Analysis of the reading time data in Experiment 2 revealed that participants were not sensitive to the mismatch between conditional promises and threats until the end of the target sentence (Region 3). This delayed sensitivity suggests that during processing, speech acts from the same speech act category (inducements) take longer to discriminate following a mismatching anaphoric reference than speech acts from different categories (i.e., compared to the rapid penalty observed in Experiment 1). Since mode of reasoning and speech act category were held constant across conditions, our findings can only be attributable to the within category difference. This is consistent with the idea that speech acts within the same category are pragmatically closer (and thus harder to discriminate) than speech acts from different categories.

Interestingly, our results also revealed that when the delayed sensitivity to a mismatching anaphor eventually arose, the pattern of results was asymmetrical. Specifically, there was no statistically significant processing penalty when an implied threat (e.g., "if the results are written later than next week, then I'll take you off the project") was anaphorically referenced as a promise (20 msec.). However, there was a large processing penalty (100 msec.) when an implied promise (e.g., "if the results are written by next week, then I will put you on the paper as an author") was referenced as a threat.

One explanation for this pattern of findings is that promises have a broader pragmatic scope than threats. Indeed, the common phrase "*it's not a threat, it's a promise*" emphasises how threats can be subsumed by promises. In this instance the speaker is using the perceived obligation associated with a promise (Searle & Vanderveken, 1985) to show that their threat is not hollow. Conversely, it would be

unusual to for someone to assert "*it's not a promise, it's a threat*", as this makes the speech act pragmatically *weaker* by reducing the degree of obligation. Participants in Experiment 2 appear to have followed this distinction as they experienced a numerically large processing penalty when trying to interpret promises as threats.

4.1 General Discussion

Two experiments examined the interpretation of implied conditional speech acts during comprehension. In Experiment 1 a rapid reading time penalty was observed when an inducement (promise) or advice (tip) was anaphorically referenced as a speech act from a different category. In Experiment 2 a *delayed* penalty was observed when the mismatching anaphor was a speech act noun from the *same* category. In combination, these findings support a classification scheme that includes the broad speech act categories of inducement and advice. While speech acts from different categories are rapidly perceived as mismatching, speech acts from within the same category appear to be pragmatically closer and thus take longer to discriminate.

In terms of the pragmatic cues algorithm, our processing data are consistent with the idea that conditionals from different categories are more pragmatically distinct from those from the same category. However, they also revealed an important distinction *within* speech act categories. At present the second stage of the pragmatic cues algorithm distinguishes promise from threats based on the utility of the consequent for the listener. However, our data suggest that conditional promises are also perceived as having a broader pragmatic scope than threats. Participants experienced greater processing load when interpreting promises as threats than they did when interpreting threats as promises. Given that promises presuppose a greater degree of obligation than threats (Searle & Vanderveken, 1985) our findings suggest that threats may be perceived as pragmatically weaker than promises. Specifically, it appears that the act of promising can subsume the act of threatening to some extent, but threats cannot pragmatically subsume promises. Theories that rely on grouping statements under broad category labels must be able to account for such differences in interpretation *within* speech act categories.

From a discourse processing perspective, our findings show that conditional speech acts are used to inform comprehension. However, it is important to acknowledge

that our findings do not necessarily imply the *automatic* activation of conditional speech acts as they are processed (c.f., Holtgraves, 2008). What they do show is that when a speech act noun anaphorically references an implied conditional speech act, readers are sensitive to the consistency of this anaphoric reference. At present, the precise processes leading to this sensitivity are unclear. For example, readers may not automatically activate the implied conditional speech act as it comprehended. Rather, they may defer interpretation and make a strategic backwards inference when the anaphoric reference is encountered. Determining whether the activation of conditional speech acts is automatic or strategic is an important question for future research.

An issue that faces the study of conditionals more generally is how well the existing categories of conditional speech act actually capture the speaker's intent. While the speech acts described above were anaphorically referenced using the traditional labels of promises, tips, threats and warnings, further psycholinguistic research may help to identify further pragmatic cues that serve to delineate the existing categories. For instance, while the word 'tip' seems to have wide scope and could easily have be substituted for a number of synonyms in our study (e.g., suggestion, hint, advice etc.) the word 'threat' seems to have a much narrower scope and fewer synonyms. Future studies taking a time course perspective may help to more accurately define these speech act categories by revealing new pragmatic cues.

Expanding upon research that has demonstrated the importance of pragmatics on how conditionals are *ultimately* interpreted, our results show that pragmatic function guides semantic interpretation during discourse processing, providing the first step towards understanding how people understand everyday conditionals in real time. This finding suggests that experimental paradigms that focus on incremental processing provide a useful avenue for the examination of factors that influence the interpretation of conditional statements. Such approaches allow for a broader cognitive perspective on conditionals. Arguably, this is needed for a full psychological account of conditionals to be developed.

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Appendix A – Example items used in Experiment 1

Items contain both versions of implied and referenced speech act.

Chris was looking to a buy a new car. After spending all day in car dealerships he had decided to make an offer on a second hand Audi. The dealer had earlier said "if you buy the car, I'll give you 12 months free insurance" / The dealer had earlier said "if you buy the car, make sure you negotiate with the insurance company for the best deal". This was a useful promise that could save him money / This was a useful tip that could save him money. After half an hour of haggling they agreed a deal on the car.

Peter was a university lecturer who had recently submitted a research paper to a scientific journal. After a couple of months he received a reply from the journal's Editor. The reply stated "if you can make the paper shorter, then I will accept it for publication" / The reply stated "If you make the paper shorter, then it will be much easier to read". A promise like this meant it was worth taking the time to change the paper / A tip like this meant it was worth taking the time to change the paper. Producing good quality research papers was an important part of his job.

Eleanor was looking to book her summer holiday. She had visited the travel agent to try and find the best deal. The agent told her that "if your departure date is flexible, then we'll guarantee you the cheapest deal"/ The agent told her that "if your departure date is flexible, then you'll probably be able to find a cheaper deal". This promise ensured that she could get a rock-bottom price / This tip ensured that she could get a rock-bottom price. She felt like she deserved a holiday after as she hadn't been away in over a year.

Appendix B – Example items used in Experiment 2

John was in a meeting with his project supervisor at university. They were discussing the results of the study for which John was employed as a research assistant. John's supervisor said to him "if the results are written by next week, then I will put you on the paper as an author" / John's supervisor said to him "if the results are written later than next week, then I'll take you off the project". John decided based upon this promise that he would make sure the results were completed/John decided based upon this threat that he would make sure the results were completed. He thought he would work on it over the weekend if necessary.

Adam and Nancy had been going out for over a year and Adam wanted Nancy to move in with him. However, Nancy hated Adam's smoking and how her clothes smelt after being out with him. One night Nancy stated "If you give up smoking, then I will move in with you". / One night Nancy stated "If you keep on smoking, then I will break up with you". Nancy's promise made Adam realise how much she hated his smoking/Nancy's threat made Adam realise how much she hated his smoking. He decided that perhaps it was a dirty habit.

Mary was halfway through her 12-month mobile phone contract and was unhappy with the service. She called her mobile phone provider and said she wanted to change networks. The customer service assistant told her "If you stay with our network, then we'll give you 100 free texts every month." / The customer service assistant told her "If you leave our network, then we'll take back your free phone." This was the kind of promise that might influence her decision/This was the kind of threat that might influence her decision. Although the salesperson was asking for her to make a decision Mary decided to think about it for a few days.

Table 1: Mean reading times and standard errors (msec.) for each analysis region in Experiment 1.

	Implied Speech Act	Referenced Speech Act	
		Promise	Tip
Region 1	Promise	301 (18)	323 (18)
	Tip	321 (18)	295 (17)
Region 2	Promise	1,810 (87)	1,802 (88)
	Tip	1,832 (102)	1,723 (87)
Region 3	Promise	382 (43)	347 (26)
	Tip	340 (28)	324 (24)

Table 2: Mean reading times and standard errors (msec.) for each analysis region in Experiment 2.

	Implied Speech Act	Referenced Speech Act	
		Promise	Threat
Region 1	Promise	316 (18)	319 (21)
	Threat	321 (20)	337 (21)
Region 2	Promise	2,037 (167)	2,149 (164)
	Threat	2,093 (172)	2,016 (132)
Region 3	Promise	329 (23)	450 (44)
	Threat	349 (25)	350 (30)

Fig. 1: Pragmatic cues algorithm (López-Rousseau & Ketelaar, 2006)