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# Slippery Slope Arguments imply opposition to change

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## SLIPPERY SLOPE ARGUMENTS

### Abstract

Slippery Slope Arguments (SSAs) of the form *if A, then C* describe an initial proposal (A) and a predicted, undesirable consequence of this proposal (C) (e.g., “*If cannabis is ever legalised, then eventually cocaine will be legalised too*”). Despite SSAs being a common rhetorical device, there has been surprisingly little empirical research into their subjective evaluation and perception. Here, we present evidence that SSAs are interpreted as a form of consequentialist argument, inviting inferences about the speaker’s (or writer’s) attitudes. Study 1 confirms the common intuition that a SSA is perceived to be an argument *against* the initial proposal (A), while Study 2 shows that the subjective strength of this inference relates to the subjective undesirability of the predicted consequences (C). Because arguments are rarely made out of context, Studies 3 and 4 examined how one important contextual factor, the speaker’s *known* beliefs, influence the perceived coherence, strength and persuasiveness of a SSA. Using an unobtrusive dependent variable (eye movements during reading) Study 3 showed that readers are sensitive to the internal coherence between a speaker’s beliefs and the implied meaning of their argument. Finally, Study 4 revealed that this degree of internal coherence influences the perceived strength and persuasiveness of the argument. Together, these data indicate that SSAs are treated as a form of negative consequentialist argument. People infer that the speaker of a SSA opposes the initial proposal; therefore SSAs are only perceived to be persuasive and conversationally relevant when the speaker’s attitudes match this inference.

Key words: Slippery Slope; Argumentation; Inference; Conditional reasoning; Experimental Pragmatics

### **Slippery Slope Arguments imply opposition to change**

People frequently argue against relatively moderate proposals on the basis that their implementation will start a chain of events that ultimately leads to an undesirable outcome. For example, an anti-drug use campaigner might argue that legalising cannabis will put lawmakers on a slippery slope towards the legalisation of much harder drugs, like cocaine. These so-called Slippery Slope Arguments (SSAs) are common in everyday discourse and frequently used in political, legal and ethical debates (see Walton, 1992, for various examples). Despite being subjectively persuasive to some, this type of argument is often viewed as a logically fallacy (e.g., see Tindale, 2007 for a discussion), although, there is some evidence that SSAs may have a rational basis in Bayesian decision theory (Corner, Hahn & Oaksford, 2011; Hahn & Oaksford, 2007).

The prototypical SSA takes the conditional form *if antecedent (A), then consequent (C)* and may make explicit reference to a ‘Slippery Slope’ (see 1), but often this metaphor is implicit (see 2).

1. *If we agree to air strikes against the enemy, [then] we will be on a slippery slope towards ‘boots on the ground’.*
2. *If voluntary euthanasia is ever legalised, [then] it will ultimately lead to the legalisation of involuntary euthanasia.*

These examples are of a form that Walton (2015) refers to as ‘compressed slippery slope arguments’ that jump from an initial proposal to the distal consequences, leaving the intermittent steps unstated. The content and subjective strength of these arguments can vary widely, but they share several common features (Rizzo & Whitman, 2003). In an initial effort to provide a definition of the SSA that is useful from a psychological perspective Corner et al. (2011) identified four distinct components:

- a. An initial proposal (A)
- b. An undesirable outcome (C)
- c. The belief that allowing (A) will lead to a re-evaluation of (C) in the future
- d. The rejection of (A) based on this belief

The *initial proposal* is typically stated as a conditional antecedent (*if A...*) while the *undesirable outcome* is stated in the consequent clause (*...then C*). *Belief* in a SSA is based on the perceived likelihood that allowing (A) will raise the probability of (C) in the future. Therefore, like other types of thematic conditional, the degree of *belief* in a SSA is based on the subjective conditional probability of (C) given (A) (c.f., Evans & Over, 2004). Corner et al. (2011) demonstrated that the algorithmic level mechanism for establishing these degrees of belief relies on a process of category boundary re-appraisal, whereby classifying one item (e.g., cannabis) into a new category (e.g., ‘legal

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drugs') increases the likelihood of further items being classified in the same category (e.g., cocaine). A consequence of this mechanism is that the more similar the items at the top (e.g., cannabis) and bottom (e.g., cocaine) of the slippery slope, the stronger the argument is perceived to be. From this perspective, example 3 (in which the ends of the slope are similar) should be perceived as a subjectively stronger argument than example 4 (in which the ends of the slope are dissimilar).

3. *If Class C drugs are legalised, then class B drugs will ultimately be legalised too.*

4. *If Class C drugs are legalised, then automatic weapons will ultimately be legalised too.*

The final aspect of the definition by Corner et al. (2011) concerns the ultimate rhetorical purpose of a SSA, that is to imply that the initial proposal should be rejected. In this way, SSAs are similar to conditional dissuasions, in which an undesirable consequence is offered as a disincentive to act on the initial proposal (cf. Thompson, Evans & Handley, 2005). The proposed illocutionary function of SSAs is uncontroversial among theorists, regardless of whether this type of argument is viewed as a fallacy. However, there is currently no direct psychological evidence that people do actually infer the speaker's or writer's opposition to the initial proposal. This type of inference requires the recipient of a SSA to simultaneously reason from their own perspective but also from the perspective of the speaker (Thompson et al., 2005), a process that may be far from trivial in light of evidence demonstrating that even neurotypical adults can be fallible when it comes to mentally representing the basic beliefs, desires and intentions of others (e.g., Birch & Bloom, 2007).

In this paper we address this gap in the literature by examining what the utterance of a SSA reveals to a recipient about the attitudes of the speaker. We propose that the SSA is treated as form of consequential, dissuasive argument that implies the speaker's desire to avoid a proposed action (c.f., Bonnefon & Hilton, 2004; Thompson et al., 2005; Walton, 2015). Using a set of twenty four novel SSAs we first present empirical evidence for a common intuition, namely that SSAs imply the speaker's opposition to the initial proposal (A). In terms defined by Austin (1962), the *illocutionary force* of a SSA is to imply the speaker's opposition to change, while the *perlocutionary act* of a SSA is to persuade the listener (or reader) to feel the same. Establishing empirically the extent to which SSAs achieve their illocutionary and perlocutionary goals will act as a foundation for future research. While this type of argument has generated much theoretical discussion in the fields of philosophy, ethics and law, empirical studies of its subjective perception and affect are scarce.

After Study 1 provides the empirical foundation, Study 2 examines how readers use the decision theoretic characteristics of a SSA to evaluate the strength of the speaker's opposition to change and the extent to which these arguments affect the beliefs of the recipient. Because this type of argument is rarely made out of context, Studies 3 and 4 examine how one important contextual factor, the speaker's *known* beliefs, may influence the perceived coherence, strength and persuasiveness of a

SSA. Using an unobtrusive dependent variable (reading times measured using an eye tracker), Study 3 examines whether readers *spontaneously* infer a speaker's opposition to change during real time, online processing of a SSA. By varying the speaker's explicitly stated beliefs (e.g., the speaker is described as opposing or supporting the initial proposal), this method allows us to assess the perceived degree of internal coherence and conversational relevance of a SSA with respect to the speaker's beliefs and intentions. Finally, since the perlocutionary goal of a SSA is to persuade the recipient, Study 4 examines how the degree of coherence between the speaker's intentions and the meaning implied by their argument influences the perceived strength and persuasiveness of a SSA.

### Study 1

There is currently no direct psychological evidence that SSAs result in inferences about the attitudes of a speaker; however there is some evidence that other forms of conditional statement do imply that the speaker opposes an initial proposal. For example, conditional warnings (e.g., *If you have another drink, you will miss your plane*) and threats (e.g., *If you turn up late again, I will fire you*) are routinely identified as dissuasions against an initial proposal, based on the negative utility of their consequences (López-Rousseau & Ketelaar, 2006; Thompson et al., 2005; see also Evans, Neilens, Handley & Over, 2008). However, SSAs differ from threats and warnings because the initial proposal tends to describe the potential action of a third party, rather than an action of the hearer or reader. As a result, Corner et al. (2011) argue that the SSA can be better categorised as a form of negative consequentialist argument (also known as an 'appeal to negative consequences'), expressed in the form of a consequential conditional (cf. Bonnefon, 2009; Bonnefon, Haigh & Stewart, 2013; Bonnefon & Hilton, 2004).

Consequential conditionals are simply conditional statements (*If A, then C*) that describe the controllable action of a third party (A) and its valued consequences (C). When a consequential conditional has undesirable consequences (e.g., "*If Didier takes up this new job, he will be paid less and be less happy*") it is rational to infer that the antecedent action will not be taken (i.e., that Didier will not take up the job). As perceived undesirability of the predicted consequence increases, so does the strength of this inference (Bonnefon & Hilton, 2004). Therefore, if somebody utters a conditional argument that outlines the undesirable consequences of an initial proposal, it is rational, from this perspective, to infer that they are arguing *against* the initial proposal. The more undesirable the predicted consequences, the stronger this inference should be.

In Study 1 we present evidence that people treat SSAs as a form of negative consequentialist argument and infer that the speaker is arguing for the initial proposal to be rejected. We constructed twenty four SSAs differing in lexical and semantic content, but sharing the same syntactic and

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pragmatic features (the full list of arguments can be found in Appendix 1). A limitation of previous SSA studies is that they rely on data from a limited number of examples and are therefore at risk of committing the ‘language as fixed effect fallacy’ (Clark, 1973). Participants were presented with the arguments and asked to write down, in their own words, what they could infer about the speakers attitudes towards the topic described in the antecedent (‘if...’) clause (see Figure 1 for an example of this task).

**Figure 1:** Example of a SSA and question used in Study 1.

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Jayne and Carly were discussing their feelings about euthanasia. Carly argued that “*If voluntary euthanasia is ever legalised, it will ultimately lead to the legalisation of involuntary euthanasia*”.

**From this statement, what can you infer about Carly’s attitudes towards voluntary euthanasia?**

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### *Method*

Twenty three participants (11 females, mean age 28.4 years) were recruited from an online participant pool ([www.prolificacademic.co.uk](http://www.prolificacademic.co.uk)). They completed the task online in their own time and location. All participants were native English speakers and did not take part in the other studies presented below. They were each paid £3.50.

Study 1 was conducted online using Qualtrics. Each participant was presented with the 24 SSAs. For each argument they were asked to write down what they could infer about the speakers attitude towards the topic described in the antecedent clause (with a limit of 200 characters). If participants felt that nothing could be inferred from an argument, they were instructed to reply by typing ‘nothing’. These arguments were interspersed with 24 filler arguments that had positive consequences (e.g., *If the minimum wage is raised, then living standards will eventually improve*). Each participant saw 48 arguments (24 SSAs plus 24 filler items) presented in a unique random order.

### *Results & Discussion*

Responses to each item were categorised according to the type of inference that was generated. Specifically, each response was coded into one of the following four categories:

- a) The participant infers that the speaker *opposes* action A
- b) The participant infers that the speaker *supports* action A
- c) The participant explicitly states that ‘nothing’ can be inferred from the argument

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d) The participant provides an invalid response by paraphrasing the argument (without making any inference), or by providing an irrelevant answer

Responses were categorised by the first author. They were also independently categorised by a second coder who was not otherwise involved with this research. There was a very high level of agreement between the two coders ( $\kappa = .85$ ,  $p < .001$ ). On average, participants inferred that the speaker was arguing against the action described in the antecedent clause for 76.8% of the SSAs. Example verbatim responses to the SSA presented in Figure 1 are provided below:

Participant 2: *“Carly disagrees with voluntary euthanasia”*

Participant 3: *“Carly does not think voluntary euthanasia should be legalised, as it could lead to murder.”*

Participant 16: *“Carly thinks the risks associated with the escalation of the laws is not worth legalising voluntary euthanasia.”* [sic]

Participant 19: *“Carly opposes voluntary euthanasia.”*

The remaining responses were split between the other three categories. Some responses directly stated that nothing could be inferred (6.3%), while a minority of responses indicated that the speaker was actually in favour of the antecedent action (0.5%). All other responses (16.3%) were coded as invalid because the participant simply paraphrased the argument without making any inference, or provided an irrelevant answer. These data confirm the common intuition that SSAs imply the speaker’s desire to avoid the initial proposal. Participants treated SSAs as a form of negative consequentialist argument with decision theoretic features. Given that SSAs, by definition, predict a negative outcome (C) they imply that the speaker is against any action (A) that might see this outcome realised.

## Study 2

An individual that produces a SSA could choose to highlight any number of undesirable consequences that differ in their severity, but they must consciously choose just one. For example, a speaker could choose to argue that the legalisation of Class C drugs in the UK could ultimately lead to the legalisation of Class B drugs (a moderately undesirable consequence) or to the legalisation of Class A drugs (a very undesirable consequence). Therefore the recipient may use the subjective severity of the chosen consequence as a proxy to infer the strength of the speaker’s opposition to the initial proposal. Indeed, if SSAs are treated as a form of negative consequentialist argument, then the extent to which a speaker is seen to oppose the initial proposal (A) should be related to the severity of its predicted undesirable consequences (C) (Bonneton & Hilton, 2004). To test this prediction we



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presented participants with the same 24 SSAs used in Study 1 and asked them to rate i) the undesirability of the predicted consequence for each argument, and ii) the degree to which each argument implied that the initial proposal should be rejected. We predict that the more undesirable these predicted consequences, the more that the speaker will be seen to be arguing against the initial proposal.

A secondary aim was to assess the extent to which a SSA influences the perceptions of a reader. A SSA can only be effective if it causes the recipient to believe that the initial proposal will actually raise the probability of the undesirable outcome. We therefore measured the prior subjective probability of the 24 undesirable events described in the consequent clauses of our SSAs (C) and also the subjective conditional probability of these consequences occurring *given that* the initial proposal also occurs. If SSAs successfully raise the subjective probability of an undesirable event, then the subjective conditional probability of (C) given (A) should be higher than the prior subjective probability of (C).

### *Method*

We collected subjective ratings of five variables associated with the same 24 SSAs used in Study 1:

- i) The prior subjective probability of (A)
- ii) The prior subjective probability of (C)
- iii) The subjective conditional probability of (C) given (A)
- iv) The subjective undesirability of (C) (high scores equal greater undesirability)
- v) The extent to which the argument implies that the initial proposal (A) should be rejected (high scores mean that rejection is strongly implied)

Ratings were provided on a 0-100 scale (see Appendix 1 for the full list of arguments and their mean ratings). Probability ratings were converted to a 0-1 scale for analysis purposes.

Forty five psychology students from the University of Manchester (42 females, mean age 19.2 years) provided five ratings for each of the 24 arguments. The task was administered online using Qualtrics. Participants completed the task in their own time and location. Each participant received partial course credit. All were native English speakers and none took part in the other three studies. The five questions were presented concurrently, immediately below each argument. Each participant saw the 24 arguments in a different random order.

### *Results & Discussion*

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The t-tests reported below treat subjects ( $t_1$ ) and items ( $t_2$ ) as random factors. In Studies 2, 3 and 4 the by-subjects analysis allows us to assess whether our results can be generalised beyond the specific sample of participants recruited for this study, while the by-items analysis allows us to assess whether our results can be generalised beyond the specific arguments used in this study (c.f., Clark, 1973).

Ratings indicated that the arguments were perceived to have highly undesirable outcomes (mean = 81.6) and strongly implied that the argument was against the initial proposal (mean = 77.6). There was a strong positive relationship between these two variables ( $r = .847, p < .001$ ). The more undesirable the predicted outcome, the more the argument implied that the antecedent action should be rejected. The conditional probability of (C) given (A) was greater than the prior probability of (C) (0.25 vs. 0.18;  $t_1(44) = 7.7, p = < .001, d = 1.2$   $t_2(23) = 4.3, p = < .001, d = .92$ ) indicating that the arguments successfully raised the perceived probability of the consequent event (C). However, even though the argument raised the subjective probability of C from 0.18 to 0.25, the perceived likelihood of this event was still low in absolute terms (0.25). In contrast, the message implied by the argument was strongly accepted. This pattern of results may be explained by the balance of utilities between the initial proposal of a SSA and its predicted consequences. The formulation of a SSA applied by Corner et al. (2011; see also Evans et al., 2008) treats the evaluation of a SSA as a cost-benefit analysis, weighing up the benefit of the proposed action against the cost of the predicted consequences. For most SSAs the benefits of the initial proposal are relatively less than the costs of the predicted consequence. If taking the antecedent action leads to even a small increase in the likelihood of C, then the benefit of taking this action may not be worth raising the probability of its possible consequences. This could explain why the speaker's implied opposition to action A was perceived so clearly by our participants.

These data suggest that SSAs are an effective rhetorical device; they increase the perceived likelihood of an undesirable event and strongly imply that the speaker wants the initial proposal to be rejected. The more undesirable the predicted consequence of the initial proposal, the more the speaker was seen to be arguing for the rejection of this proposal. This is consistent with the notion that SSAs are a form of negative consequentialist argument. These characteristics were shared by a variety of SSAs that differed in semantic content, therefore our results can be generalised beyond the specific arguments used in this study (c.f., Clark, 1973; Judd, Westfall & Kenny, 2012).

### Study 3

Thompson et al. (2005) argued that the evaluation of a conditional persuasion or dissuasion requires the recipient to reason from two independent perspectives. Specifically, an argument can be evaluated

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from the speaker's perspective (i.e., to decode their implied message) but also from the recipient's own perspective (i.e., to evaluate how convinced they are). The purpose of Study 3 is to determine whether people *spontaneously* track the beliefs and intentions of the speaker. As shown by Studies 1 and 2, the default interpretation of a SSA is that the speaker opposes the initial proposal; therefore, if people spontaneously adopt this perspective, SSAs should only be perceived to be congruent when the speaker's attitudes permit this interpretation.

To test this prediction we tracked eye movements as participants read SSAs embedded in vignettes. This method has been employed previously to examine how readers make rational inferences about the motivations and intentions of others (e.g., Haigh, Ferguson & Stewart, 2014; Haigh & Bonnefon, 2015a; Haigh & Bonnefon, 2015b; Stewart, Haigh & Ferguson, 2013). Indeed, there is a large literature in discourse psychology exploring the extent to which readers monitor and evaluate the goals (Huitema, Dopkins, Klin & Myers, 1993), beliefs (Albrecht & O'Brien, 1993), emotions (Gernsbacher, Goldsmith, & Robertson, 1992) and abilities (Stewart, Kidd & Haigh, 2009) of a protagonist. This type of study commonly employs the contradiction paradigm, whereby participants read vignettes describing characters that act or speak in a way that contradicts their stated (or inferred) beliefs, desires or abilities. The effect this contradiction has on the processing is typically measured using an unobtrusive dependent variable, such as reading time to a critical region of text. For example, Albrecht and O'Brien (1993) found a reading time penalty when a vegetarian character ordered a hamburger, Huitema et al. (1993) found a similar penalty when a character who wanted to swim and sunbathe subsequently booked a flight to Alaska, while Haigh and Bonnefon (2015a) reported a penalty when a character avoided ordering the oysters that would make her happy.

In Study 3 we employed the contradiction paradigm, and used eye tracking to record fixation times to the antecedent and consequent clauses of a SSA. This paradigm allows us to examine the mental representation, or situation model (Zwaan & Radvansky, 1998), that readers build as they process a SSA (e.g., that the speaker opposes action A). If this mental representation matches what is already known about the beliefs and attitudes of the speaker, then the SSA should be read quickly and fluently. In contrast, if the representation of a SSA mismatches the beliefs and attitudes of the speaker, then the SSA should result in relative disruption to normal, fluent reading. Such an effect will tell us two things a) that readers make a spontaneous inference from a SSA about the speaker's attitudes, and b) that this inference is rapidly cross referenced with the speaker's known beliefs, to assess its conversational relevance and the speaker's internal coherence.

Participants were presented with vignettes that described fictional characters uttering the 24 SSAs used in Studies 1 and 2. Prior context of each vignette was manipulated so that the stated beliefs of the character asserting the SSA were either Consistent with an argument against the initial proposal (A), Inconsistent with an argument against the initial proposal (A) or Neutral (unknown attitude towards

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the initial proposal) (see Figure 2 for an example of the three conditions and Appendix 2 for full list of experimental items).

**Figure 2:** Example vignette used in Study 3. Each vignette was presented in one of three contexts. The SSA is highlighted in bold and the two analysis regions are separated by vertical bars.

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<b>Introduction</b>	Jayne and Carly were discussing their feelings about euthanasia.
<b>a) Consistent context</b>	<i>Carly was strongly against it becoming legal in the UK.</i>
<b>b) Inconsistent context</b>	<i>Carly was strongly in favour of it becoming legal in the UK.</i>
<b>c) Neutral context</b>	<i>Carly had recently heard that it could become legal in the UK.</i>
<b>Antecedent (A)</b>	She argued that   <b>“If voluntary euthanasia is ever legalised,</b>
<b>Consequent (C)</b>	<b>it will ultimately lead to the legalisation of involuntary euthanasia”.</b>
<b>Final sentence</b>	They were both engrossed by a live television debate on the subject.

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It is predicted that the assertion of a SSA will only be perceived as conversationally relevant when the speaker’s attitudes permit the default interpretation of a SSA (i.e., opposition to the initial proposal). As a result, the assertion of a SSA should be pragmatically acceptable to readers when the speaker is known to oppose the initial proposal or has unknown attitudes toward the initial proposal (Consistent and Neutral conditions), as neither of these attitudes contradict the implied opposition to this proposal. However, the SSA should not be pragmatically acceptable when the speaker is known to support the initial proposal (Inconsistent condition) as this supportive attitude contradicts the default interpretation of a SSA. This context manipulation should result in the same arguments being read quickly and fluently in the Consistent and Neutral conditions, but with relative disruption in the Inconsistent condition, as readers perceive an apparent contradiction.

We examined how each of these contexts influenced the processing of SSAs. Specifically, we measured how fluently readers were able to process the antecedent (*if A...*) and consequent clauses (*...then C*) in each of the three experimental conditions. We expect any effects of context to first emerge as the consequent clause is read, as this region of text is the earliest point at which the utterance can be identified as a SSA.

## Method

### *Participants*

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Twenty four native English speakers with normal or corrected-to-normal vision completed the experiment (21 females, mean age 19 years). Three additional participants did not complete the experiment and their data were excluded. Participants were students from Northumbria University and did not take part in the other three studies. Each received £5 cash.

### *Design & Materials*

Experimental items were vignettes describing a discussion between two fictional characters. In each item a character was described as either being against an initial proposal (Consistent condition) or in favour of this proposal (Inconsistent condition). A third, Neutral condition provided no information about the character's attitudes (see Figure 2). In the following sentence the character utters a SSA of the form *if A, then C*. Participants were exposed to each of the three conditions in a Latin Squared repeated measures design.

Twenty four SSAs were constructed, and each was embedded in vignettes corresponding to the Consistent, Inconsistent and Neutral conditions. The resulting 72 vignettes were four sentences in length (see Appendix 2 for full list of items). Sentence one introduced two characters. Sentence two was manipulated, with the protagonist described as being either *for* or *against* a given proposal (A). In the Neutral condition, no information was given about their attitude towards the proposal. In sentence three, the protagonist uttered a SSA of the form *if A, then C*. Sentence four provided a continuation of the narrative. Within each scenario, sentences one, three and four were identical across conditions.

One version of each scenario was placed into one of three Latin Squared presentation lists. Eight participants were assigned to each list. Each participant read 24 experimental items plus an additional 24 filler items from an unrelated experiment. None of the filler items contained conditionals or arguments. The 48 items were presented in a different random order to each participant.

Comprehension questions followed half of the items and were solved with a mean accuracy of 87%.

### *Procedure*

Participants read the vignettes silently for comprehension. Eye movements were recorded using an Eyelink 1000 in desktop mount configuration. Viewing was binocular and recordings were sampled from the right eye at 1000Hz. Vignettes were presented in size 20 Arial font on a CRT monitor 80cm from the participants' eyes. The head was stabilised using a chin rest.

The eye tracker was calibrated using nine fixation points. Each trial began with a gaze trigger. Fixation on the gaze trigger caused the vignette to appear. After reading a vignette participants pressed a button on a handheld controller to advance either to a question or the next trial.

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### *Analysis*

We analysed reading times to the antecedent clause of the argument (*if A...*) and to the consequent clause of the argument (*then C...*) (see Figure 2). These analysis regions were lexically identical within items across the three conditions. Fixations <80ms were pooled with adjacent fixations, while fixations <40ms were excluded if they were not within three characters of another fixation. Fixations >1200ms were truncated to 1200ms.

The measure chosen to index the speed and fluency of reading was Regression Path reading time. This measure records the summed duration of fixations (in milliseconds), from when the eyes first enter a region of text to when the eyes first exit that region to the right. This measure is commonly described as the time taken to *go past* a region of text.

Analyses were conducted using one way repeated measures ANOVAs with subjects ( $F_1$ ) and items ( $F_2$ ) as random factors. Significant effects were further analysed using planned comparisons.

Because there were three planned comparisons following each ANOVA the Bonferroni corrected  $\alpha$  was adjusted from .05 to .017.

## Results & Discussion

**Figure 3:** Mean Regression Path reading time in milliseconds to the antecedent and consequent clauses of our SSAs (means averaged over participants, error bars represent standard error of the mean). Prior context was manipulated to be either Consistent, Neutral or Inconsistent with the assertion of a SSA.

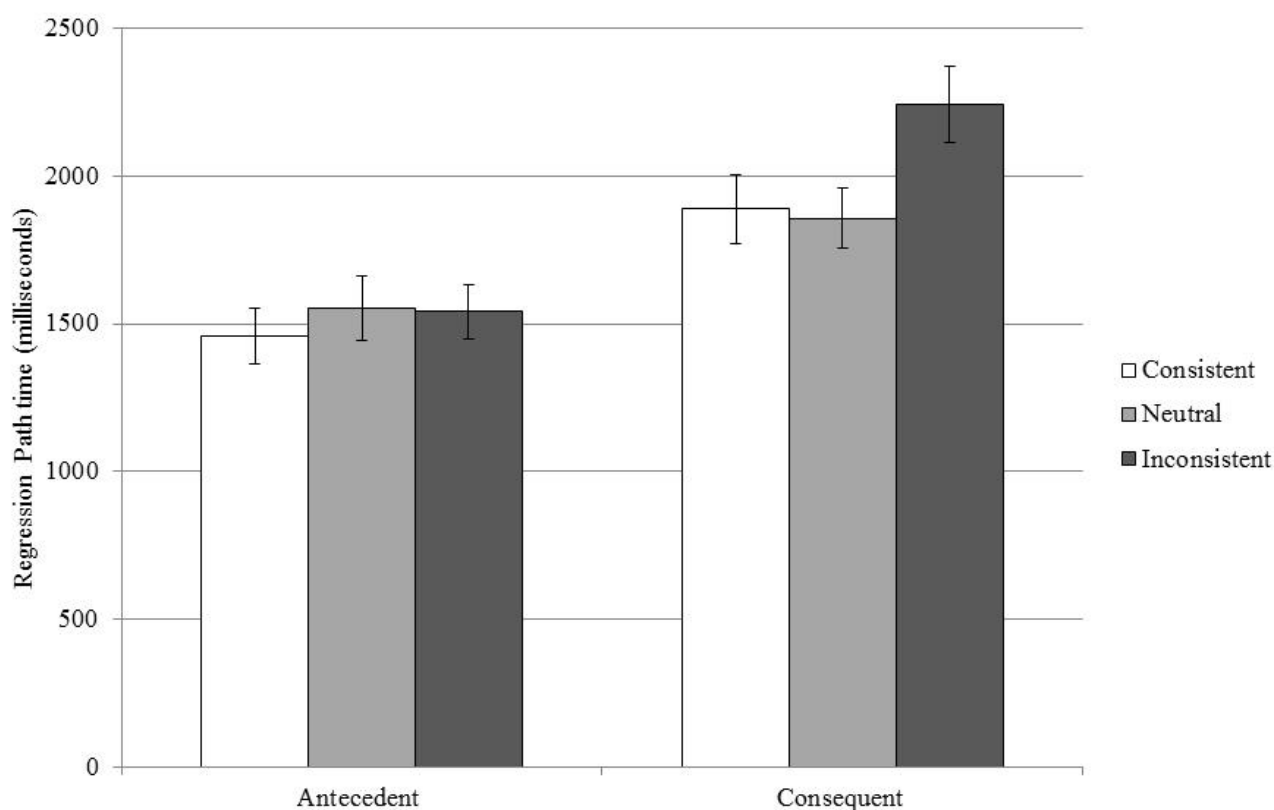


Figure 3 shows the mean reading time (in milliseconds) averaged across participants for each analysis region and condition. ANOVA revealed no effect of context on Regression Path reading times to the antecedent region (both  $F_s < 1$ ). However, an effect did emerge as the consequent clause was first encountered ( $F_1(2,46) = 7.3, p = .002, \eta_p^2 = .242$ ;  $F_2(2,46) = 4.8, p = .013, \eta_p^2 = .172$ ). Planned comparisons reveal that it took more time to initially *go past* the consequent region following the Inconsistent context than following the Consistent (2243 ms vs. 1888 ms;  $F_1(1,23) = 8.5, p = .008$ ;  $F_2(1,23) = 5.8, p = .025$ ) or Neutral contexts (2243 ms vs. 1857 ms;  $F_1(1,23) = 10.1, p = .004$ ;  $F_2(1,23) = 5.9, p = .023$ ). There was no difference in Regression Path time to this region between the Consistent and Neutral contexts (1888 ms. vs 1857 ms; both  $F_s < 1$ ).

The earliest point at which an argument can be identified as a SSA is as the consequent clause is processed (because a negative consequence is a fundamental characteristic of SSAs). This region of text is where the effects of our manipulation first emerged. Regression Path reading times reveal how long it takes a reader to move past a region of text after first entering it. This measure revealed that initial processing of the consequent clause progressed equally quickly in contexts where the speaker was portrayed as being against the initial proposal (Consistent condition) and in contexts where nothing was known about the speaker's attitudes (Neutral condition). Because these conditions did not contain information that contradicted the default interpretation of a SSA, the arguments were

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seemingly perceived to be congruent. However, when the speaker's stated attitudes were in contradiction to this default SSA inference (Inconsistent condition), there was relative disruption to normal, fluent reading. These results indicate that readers spontaneously adopted the speaker's perspective and inferred that their SSA opposed action A. As a result, the assertion of a SSA was only perceived as conversationally relevant when the speaker's attitudes did not contradict this inference.

### Study 4

The reading time data in Study 3 provide evidence that processing of a SSA is influenced by what the reader knows about the attitudes and beliefs of the speaker (i.e., a SSA is relatively difficult to process when the speaker is known to support the initial proposal). Finding that a processing cost arises when a character behaves inconsistently with their beliefs and desires is not new (e.g., Albrecht & O'Brien, 1993; Huitema et al., 1993). However, finding such a cost during the processing of SSAs is revealing, as it suggests that readers are sensitive to the internal coherence between a speaker's beliefs and the meaning implied by a SSA.

The eye-tracking data in Study 3 show that readers found it easy to process a SSA when the argument did not contradict the speaker's belief states, but relatively difficult when the inferred meaning of the argument contradicted these beliefs. The purpose of Study 4 is threefold. First, is to confirm that differences in the eye movement record were indeed due to the perceived degree of coherence between the speaker's beliefs and the assertion of a SSA. Second, is to confirm that any such differences arose due to participants inferring that the SSA implies opposition to the initial proposal (A). Finally, we examined the extent to which our congruency manipulation influenced overall persuasiveness of the argument from the recipient's perspective. This final aim is crucial. While Study 3 shows that people spontaneously infer the message communicated by the speaker (the illocutionary force), it tells us nothing about how the message is evaluated from the reader's own perspective (the perlocutionary act). Investigating how people understand the intentions behind the meanings of utterances is a central issue in the field of experimental pragmatics (Noveck & Reboul, 2008).

We asked participants to rate each of our 24 SSAs in each of the three contexts used in Study 3 (i.e., Consistent, Inconsistent, and Neutral). These ratings measured (a) the extent to which the argument is consistent with the speaker's beliefs, (b) the extent to which the producer opposes the initial proposal, and (c) the extent to which the producer makes a *persuasive* argument. If our eye-tracking results arise from the fact that readers are sensitive to incoherence between what the producer believes and what



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they imply through their SSA, then we would expect to find a difference across the contexts for a measures of perceived coherence and perceived opposition to action (A). The third measure will give an insight into the extent to which a SSA is more (or less) persuasive as a function of its congruence with the speaker's beliefs. Given that the rhetorical function of SSAs is to persuade, this is a key issue. Objectively, a SSA should have the same level of persuasiveness regardless of the belief states of the person producing it. However, it is possible that the congruence between the speaker's beliefs and the argument they make may influence how persuasive the argument is perceived to be (i.e., arguments may be more persuasive when the speaker is known to believe what they imply).

### Method

#### *Participants*

Forty five psychology students from Northumbria University completed the experiment (36 females, mean age 19.6 years). All were fluent English speakers and did not take part in the other three studies. Each participant received partial course credit.

#### *Design & Materials*

Participants were presented with the same materials used in Study 3 (See Figure 2). The 24 SSAs were embedded in vignettes and presented in one of three contexts (Consistent, Inconsistent and Neutral). The dependent variables for this experiment were subjective agreement ratings to three statements:

- i) The argument is consistent with the speaker's beliefs
- ii) The speaker opposes [action A]
- iii) The speaker makes a persuasive argument

For each item the three statements were each rated on an 11 point Likert scale anchored at -5 (Strongly Disagree), 0 (Neither Agree nor Disagree) and +5 (Strongly Agree).

#### *Procedure*

The study was administered online using Qualtrics and participants completed the task in their own time and location. One version of each scenario was placed into one of three Latin Squared

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presentation lists. Fifteen participants were randomly assigned to each list. The 24 items were presented in a different random order to each participant. The vignettes were each presented on a separate page with the three questions presented concurrently, immediately below each vignette.

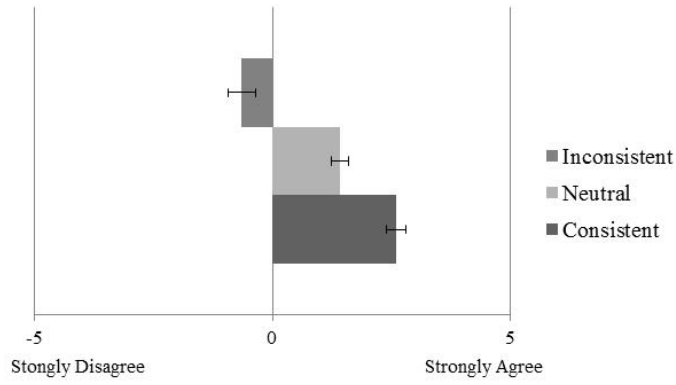
### *Results & Discussion*

Two sets of analyses were conducted for each question. We first conducted one-sample t-tests to determine whether agreement ratings in each condition differed from zero (because this value was labelled as ‘Neither Agree nor Disagree’ on the Likert scale). To examine relative differences in agreement between the three conditions we then conducted one way repeated measures ANOVAs, followed up by planned comparisons. The mean level of agreement in each condition to each of the three questions can be seen in Figure 4, while the relevant inferential statistics can be found in Table 1.

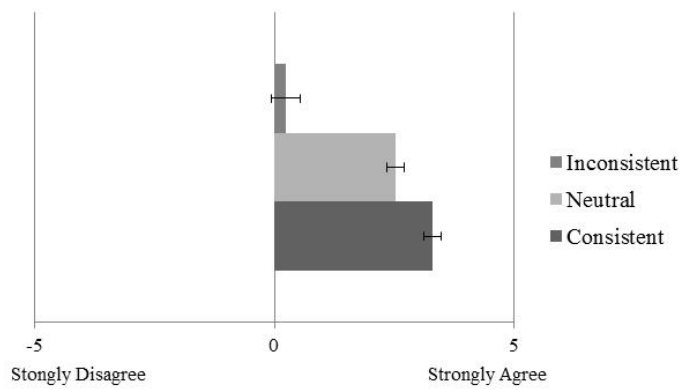
**Figure 4:** Mean agreement ratings to each of the three statements used in Study 4. Means are averaged over participants and error bars represent standard error of the mean.

*4a) The argument is consistent with the speaker’s beliefs*

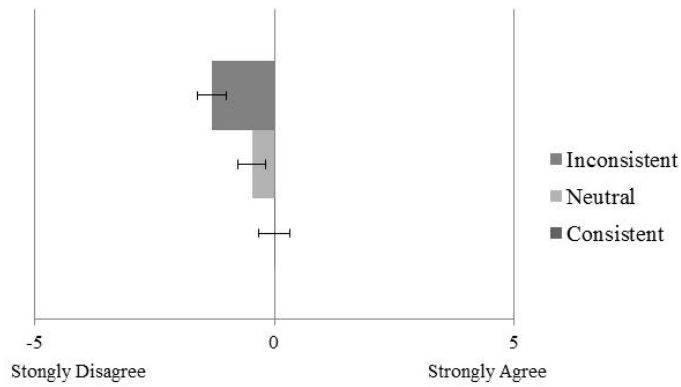
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4b) *The speaker opposes [action A]*



4c) *The speaker makes a persuasive argument*



**Table 1:** Inferential statistics for Study 4. One sample t-tests determine whether the agreement ratings in each condition differed from zero. ANOVAs and planned comparisons tested for relative differences in agreement between the three conditions, by subjects ( $F_1$ ) and by items ( $F_2$ ).

	One sample t-test			ANOVA		Planned comparisons <sup>1</sup>		
	Consistent	Inconsistent	Neutral			Consistent vs. Neutral	Consistent vs. Inconsistent	Neutral vs. Inconsistent
<i>1) The argument is consistent with the speaker's beliefs</i>	t(44) = 12.67, p < .001	t(44) = 2.21, p = .032	t(44) = 7.88, p < .001	F <sub>1</sub> (2, 88) = 63.7, p < .001, $\eta_p^2 = .591$ ; F <sub>2</sub> (2, 46) = 86.2, p < .001, $\eta_p^2 = .789$		F <sub>1</sub> (1, 44) = 38.96, p < .001; F <sub>2</sub> (1, 23) = 67.6, p < .001	F <sub>1</sub> (1, 44) = 81.6, p < .001; F <sub>2</sub> (1, 23) = 121.59, p < .001	F <sub>1</sub> (1, 44) = 47.7, p < .001; F <sub>2</sub> (1, 23) = 52.98, p < .001
<i>2) The speaker opposes [action A]</i>	t(44) = 17.93, p < .001	t(44) = .806, p = .425	t(44) = 13.82, p < .001	F <sub>1</sub> (2, 88) = 76.3, p < .001, $\eta_p^2 = .634$ ; F <sub>2</sub> (2, 46) = 95.1, p < .001, $\eta_p^2 = .805$		F <sub>1</sub> (1, 44) = 30.1, p < .001; F <sub>2</sub> (1, 23) = 15.4, p = .001	F <sub>1</sub> (1, 44) = 90.8, p < .001; F <sub>2</sub> (1, 23) = 134.6, p < .001	F <sub>1</sub> (1, 44) = 68.6, p < .001; F <sub>2</sub> (1, 23) = 100.1, p < .001
<i>3) The speaker makes a persuasive argument</i>	t(44) = .023, p = .982	t(44) = 4.42, p < .001	t(44) = 1.61, p = .115	F <sub>1</sub> (2, 88) = 21.3, p < .001, $\eta_p^2 = .326$ ; F <sub>2</sub> (2, 46) = 13.7, p < .001, $\eta_p^2 = .374$		F <sub>1</sub> (1, 44) = 6.2, p = .017; F <sub>2</sub> (1, 23) = 4.1, p = .056	F <sub>1</sub> (1, 44) = 35.1, p < .001; F <sub>2</sub> (1, 23) = 24.6, p < .001	F <sub>1</sub> (1, 44) = 17.7, p < .001; F <sub>2</sub> (1, 23) = 10.4, p = .004

<sup>1</sup>The Bonferroni corrected  $\alpha$  for the planned comparisons was .017

In Study 4 we examined the extent to which participants were sensitive to (a) the extent to which a SSA is consistent with the producer's beliefs, (b) the extent to which the producer opposes the initial proposal, and (c) the extent to which the producer makes a persuasive argument. The final question is key, as the goal of a SSA is to persuade.

For the first statement rated by participants (i.e., *'The argument is consistent with the speaker's beliefs'*) the data revealed a high degree of perceived internal cohesion in the Consistent condition. Participants also agreed (but to a lesser extent) that there was internal cohesion in the Neutral condition. In other words, neither of these contexts was inconsistent with the assertion of SSA. In the Inconsistent condition, participants did *not* perceive any internal cohesion between the argument and the speaker's beliefs. These data help us to explain the eye tracking results from Study 3. The SSA in the Consistent and Neutral conditions was read quickly and fluently because readers perceive no inconsistency between the speaker's attitudes and their subsequent argument. In contrast, the relative slowdown to reading times in the Inconsistent condition can be explained by a perceived incoherence between the speaker's attitudes and the meaning implied by their SSA.

The second statement rated by participants (i.e., *'The speaker opposes [action A]'*) allows us to determine whether the perceived degree of internal cohesion between context and the SSA results from an inference about the speaker's opposition to the initial proposal. In the Consistent condition participants agreed that the speaker opposes the antecedent action (A). This is because the context explicitly states that this is the case (and because the SSA separately implies that this is the case). Agreement was also strong in the Neutral condition (but to a slightly lesser extent); this is because participants had to base their rating only on what could be inferred from the SSA. In the Inconsistent condition, participants neither agreed nor disagreed that the speaker opposed action (A). This is because prior context stated that the speaker supported action (A) whereas the SSA implied that they opposed action (A). These conflicting pieces of information made the speaker's beliefs unclear to participants. The pattern of data suggests that perceived cohesion between the speaker's beliefs and their subsequent argument occurred because SSAs trigger people to infer that the speaker is against the antecedent action (A).

Ratings to the third statement presented participants measured the extent to which the speaker makes a persuasive argument. Since the ultimate rhetorical purpose of a SSA is to persuade other people, the response to this question allows us to determine whether the perceived internal coherence between the speaker's attitudes and the meaning implied by their SSA influences how persuasive the argument is seen to be. The first finding of note is that, on average, participants did not find the SSAs used in our study to be particularly persuasive (i.e., there was no consistent agreement that arguments were persuasive in any of the three conditions). This may have been because people were generally indifferent to the arguments or because the arguments split opinion (with positive ratings cancelling

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out negative ratings). However, there were interesting differences between the three conditions. SSAs were seen as being relatively less persuasive when their implied meaning was Inconsistent with the speaker's attitudes (relative to when the speaker's beliefs were consistent or unknown). This suggests that SSAs are perceived to be less persuasive when the meaning implied by the argument is contradicted by the speaker's stated beliefs; as the degree of coherence decreased so did the degree of persuasiveness.

### General Discussion

The four studies presented above indicate that SSAs of the form *if A, then C* are treated as a form of negative consequentialist argument, resulting in inferences about the speaker's (or writer's) attitudes. Using a set of 24 novel SSAs we first confirmed the common intuition that an individual who utters a SSA is seen to be arguing *against* the initial proposal (Study 1). We then found that the subjective strength of this inference is strongly related to the undesirability of the predicted consequences (Study 2). Studies 3 and 4 then looked at the impact of an important contextual variable on the perception of a SSA - namely the speaker's known beliefs. Eye movement data indicated that readers spontaneously adopted the speaker's perspective, with the arguments only perceived as congruent when the speaker's personal beliefs permitted opposition to the initial proposal (Study 3). Finally, Study 4 showed that the degree of internal coherence between what the speaker believes and what they imply influences the perceived strength of their argument.

Despite SSAs being a common rhetorical device in everyday discourse, there has been surprisingly little empirical research into their subjective evaluation and perception. As outlined in the Introduction, it has been argued that SSAs have four distinct components (Corner, et al., 2011). Previous research has identified an algorithmic mechanism for establishing degrees of belief in an argument (Corner, et al., 2011; Hahn & Oaksford, 2007), thus advancing our understanding of the third defining characteristic ("*The belief that allowing (A) will lead to a re-evaluation of (C) in the future*"). In this paper we focused on the pragmatic implications of the fourth defining characteristic ("*The rejection of (A) based on this belief*").

Since SSAs imply that the initial proposal should be rejected, we predicted that the assertion of such an argument would lead to inferences about the attitudes of the person making the argument. Because SSAs fit the definition of a consequentialist argument, these inferences should be informed by the subjective utility of the consequent clause (Bonneton & Hilton, 2004). When the predicted consequence of a consequentialist argument is negative, it is rational, in a decision theoretic sense, to assume that the speaker is against the initial proposal. This is what we found in Studies 1 and 2.

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Participants strongly inferred that the speaker opposed the initial action and the strength of this inference correlated with the subjective undesirability of the predicted consequences.

Inferring the speaker's opposition to a given action requires the recipient of a SSA to attribute motivations and intentions to the speaker. There is a growing body of evidence that even neurotypical adults are susceptible to making errors when attributing mental states to other people (e.g., Birch & Bloom, 2007). The data presented above indicate that SSAs communicate a very clear message about the speaker's mental states. The extent to which this message was conveyed correlated very strongly with the subjective undesirability of the proposed consequence. The more undesirable the proposed outcome, the more the argument implied that the initial proposal should be rejected. The recipient of a SSA can therefore infer much about the speaker's attitudes from just two simple cues; consequent valence and severity. A negatively valenced consequent leads the recipient to infer that the speaker opposes the initial proposal, while the severity of this consequent indicates the speaker's *degree* of opposition. These subjective cues may allow a recipient to attribute mental states to the speaker using folk understandings of human motivation, rather than reasoning about their more specific beliefs and desires. For example, if the recipient of a SSA holds the general assumption that others will act in their own best interest (c.f., Miller, 1999) and perceives the consequent of the argument to be unambiguously negative, then it can be quickly inferred that the speaker wants to avoid any action that might lead to these consequences (Bonneton, 2009; Thompson et al., 2005).

The eye movement data presented in Study 3 show that this inference is made quickly and spontaneously. Evaluation of an argument requires the recipient to look at the argument from their own perspective, but also from the perspective of the speaker (or writer) (Thompson et al., 2005). The eye movement data showed that readers readily adopted the speaker's perspective. Readers found the SSA difficult to process when the speaker had no desire to oppose the initial proposal. These data suggest that the attitudes of a character constrain expectations about what they will subsequently say or do. A context in which the speaker supports the initial proposal ruled out the expectation of a SSA, whereas the other two experimental contexts did not rule out this type of argument. The Consistent and Inconsistent conditions built clear expectations about the likely utterances of the speaker. The former made it likely that the speaker would argue against a given proposal, while the latter ruled out such an expectation. Interestingly, mean Regression Path time to the Neutral condition was indistinguishable from that in the Consistent condition, suggesting that the comprehension of a SSA may occur with minimal cognitive effort even when context does not constrain expectations. This suggests that SSAs may be treated as a form of generalised implicature that can be easily interpreted even out of context.

One of the primary rhetorical functions of a SSA is to convince the recipient that taking a seemingly moderate action will raise the probability of an undesirable outcome (and therefore convincing them

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that the initial action should not be taken). One consequence is that for a SSA to be effective, the subjective conditional probability of (C) given (A) must be greater than the prior probability of (C). This is what we found in Study 2. However, despite being statistically significant, this finding must be interpreted with some caution. The mean prior probability of the (C) was very low (.18) and although the mean probability of (C) given (A) was relatively higher (.25) it was still low in absolute terms. In other words, the arguments were effective at slightly increasing the perceived probability of an unlikely event, but even then, the probability of the outcome was perceived to be low. Indeed, when participants were asked in Study 4 how persuasive they found the arguments there was no consistent evidence that the arguments were perceived to be persuasive at all. Perceived degree of persuasiveness did differ as a function of the internal coherence between what the speaker believed and what they implied, but even when there was high internal coherence there was no consistent agreement that the arguments were persuasive (with the mean response corresponding to 'Neither Agree nor Disagree'). However, probability and persuasiveness may be irrelevant if individuals who assert SSAs are more concerned with asserting their position (i.e., that they oppose an action) than they are with convincing others that the argument is actually true. If a SSA is simply used for this purpose, then the more extreme the predicted consequence the more rhetorically useful the argument should be (regardless of its probability or persuasiveness).

The limited empirical research on SSAs to date has mainly focused on the mechanism of the Slippery Slope. Most notably, Corner et al. (2011) found that the more similar the ends of the slope, the more convincing a SSA was perceived to be. Because the focus of this paper is primarily on the rhetorical effect of SSAs we did not collect any data on the similarity of the ends of the slope, while Studies 1-3 only measured the strength of the speaker's implied message rather than the actual strength of their argument. However, our findings do provide a useful insight that should be considered in future studies on the mechanism of the slippery slope. In Study 4 we did measure perceived strength of the argument (by asking how 'persuasive' each argument was) and found that one important contextual factor (the speaker's known beliefs) influences the perceived strength of a SSA. This finding shows that to fully understand the mechanism of the SSA researchers must consider the broad social context of an argument (such as who is making the argument, why they are making the argument and who the recipient is) alongside factors such probability, utility and similarity.

An important point to consider is whether the findings reported above are unique to SSAs, or whether the same findings would be expected from any negative consequential, such as the conditional persuasions and dissuasions that have been studied in previous work. Both Bonnefon and Hilton (2004) and Thompson et al. (2005) showed that people expect an antecedent action to be avoided when its predicted consequences are negative. So far as the studies reported in this paper are concerned, it is likely that a similar pattern of results would be found with other types of conditional speech act, such as threats and warnings. Conditional threats, warnings and SSAs are all uttered with



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the intention of discouraging an initial proposal. Indeed, threats, like SSAs often describe severe, but unlikely consequences (e.g., “*if you touch my stuff, then I’ll kill you*”). The important thing is not necessarily the likelihood of the consequence being true, but the implied meaning (e.g., don’t touch my stuff) (Wray, Wood, Haigh & Stewart, submitted). In this sense, SSAs have much in common with threats, warnings and other consequential conditionals with negative consequences.

The unique contribution of the studies reported above is a) to confirm that SSAs are a form of consequential argument resulting in inferences about the speaker’s attitudes to the initial proposal b) to show that people *spontaneously* infer this perspective, and c) to show that the attitudes of the speaker influence the perceived coherence, strength and persuasiveness of their argument. These findings provide a foundation for future research exploring the situations in which SSAs and other types of consequentialist argument can be more or less effective. We have demonstrated that SSAs strongly imply opposition to change, but the persuasive effect on the recipient may differ due to various individual factors such as the recipients own prior perspective (e.g., whether they already agree or disagree with the speaker, or have no prior opinion) and the specific way in which they combine the relative costs and benefits of the proposed action and its predicted consequences.

The four studies presented above indicate that SSAs imply opposition to change. Orthogonal to the debate on whether SSAs are logically valid or invalid arguments, our data reveal that they achieve their rhetorical purpose. They strongly imply opposition to a possible action and they raise the perceived probability of an undesirable outcome. Regardless of their reputation, SSAs are an effective rhetorical device that can be asserted with high conversational relevance in situations where the speaker’s attitudes permit opposition to the proposed action.

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