CAUSAL SELECTION: THE LINGUISTIC TAKE

SETTING THE SCENE: Since the philosopher David Hume, causality is usually assumed to be a binary relation between Cause (c) and Effect (e). It is evident, however, that the occurrence of any particular effect depends, in fact, on the occurrence of a set of conditions. Consequently, philosophers often speak about *Causal Selection* (Mill 1884; see also in philosophy, history and legal theorizing Einhorn & Hogarth, 1986, Hart & Honore, 1959, Hesslow 1983, 1988, Hilton 1990, Mackie 1965, 1974, White 1965, Cheng & Novick 1991, *inter alia*), which consists in teasing apart *real* **causes** from *mere* background/enabling **conditions**. Taking as an illustration the classic case of a burned down house: while a house would not have caught fire if there were no oxygen in the relevant space, and also some flammable material, in this toy example, only a discarded cigarette butt is usually taken as *the Cause* of the fire. Accounts of Causal Selection clarified that causes and conditions hold similar logical relationships to the effect (Lewis 1973) and therefore, the choices of *the cause* should be accounted for via other types of criteria, such as the normality of the potential causal factors (Icard, Kominsky & Knobe 2017 *inter alia*), or knowledge/interest based conversational principles (Beebee 2004 *inter alia*). This paper questions the assumption that Causal Selection pertains to a metaphysical characterization of causal relations, or to the way causality is modeled in the human cognitive system, and suggests that **at least to some extent, it is a linguistic phenomenon, as it depends on the way causal relations are described by language, and that the selection varies depending on which causative construction is used**. Indeed, various studies in linguistics have demonstrated that different causative constructions do not share the same semantics (for example, in the discussion on "direct causation" reviewed by Wolff 2003, Maienborn & Hertfelder 2017, Bar-Asher Siegal & Boneh 2019, Lauer & Nadathur *forthcoming*). They also showed that constructions, which are close paraphrases of one another, do not symmetrically entail one another (e.g. *Mary closed the door* entails *Mary caused the closing of the door* but *Mary caused the closing of the door* does not entail *Mary closed the door*). **Our study demonstrates that these differences should be captured in terms of causal selection: each construction has different selection rules as to what can be encoded as the *cause* (among co-existing conditions) of the specific construction.** This paper, then, has two interrelated **GOALS**: (i) exploring the differences between the restrictions on selecting the cause in different constructions (the verb *cause* and lexical causatives/change-of-state verbs), by (ii) empirically identifying the relevant factors in selecting a cause among a set of conditions.

DESIGN: In a series of four experiments, participants were presented with scenarios in which two causes conjunctively generated an effect, i.e., both causes were individually necessary and jointly sufficient for the effect to occur. Participants were asked to rate, on a scale of 1-7, the level of adequacy of two types of causal statements: one featuring a lexical causative (e.g., *Peter opened the door*) and the other – an overt causative (e.g., *Peter caused the door to open*). The linguistic construction was the primary factor, with each experiment manipulating a different contributing factor: (i) temporal ordering of causes (Exp.1, 2, & 4); (ii) the first cause being an enabler (Exp. 2); (iii) deviation from normativity (Exp.3 & 4); (iv) intention (Exp. 1). All experiments were designed in English and conducted online, with a sample of native speakers of English provided by *prolific.org*, paid according to standard. Samples sizes for each experiment were chosen to yield an adequate power for a moderate effect of causative construction.

RESULTS: Figure 1 illustrates the results of the four experiments showing mean ratings and their confidence intervals as well as crucial significant differences (marked by "sign."). When the causes followed each other, participants overwhelmingly preferred the later cause as the subject of both lexical causative and overt causative construction (Exp. 1 & 2). This effect, however, is moderated by norm violation (Exp. 3-4), enabling (Exp. 2), and intentionality (Exp. 1). When the first cause violates a norm, it is judged more causal for overt causatives than lexical causatives; the same is true when the second cause violates the norm (Exp. 4), indicating that overt causative constructions are sensitive to responsibility. When both causes were actions not intended to achieve the effect, the second was rated more causal, but overt

causatives were rated lower than lexical causatives (In Fig.1 Exp.1 the two rightmost bars are lower than the others). When the first cause was an enabler, ratings for lexical causatives describing the first cause were particularly low (Exp. 2) At this point we have mixed results whether norm violations affect the endorsement of lexical vs. overt causatives, as the interaction found in Experiment 3 is weak. On-going experiments examine the role of foreseeability as an additional factor.
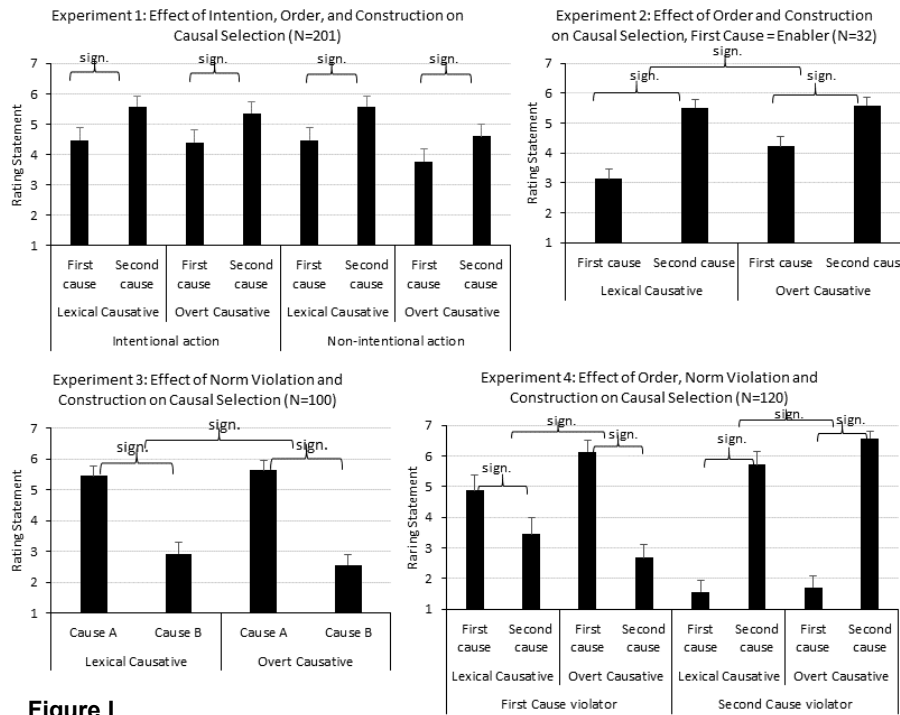

Figure I

DISCUSSION: Our study shows that speakers' evaluations of the adequacy of different causal statements *vis à vis* a particular state-of-affairs vary systematically, depending on the type of linguistic expression employed to describe them. **This variation indicates that causal selection depends at least partially on linguistic facets and not merely on the metaphysical or cognitive characteristics of the relata.** These findings are in line with the theory on the semantics of causative constructions put forward by Baglini & Bar-Asher Siegal (2019), which shows that lexical causatives should select the last condition, while overt causatives should prefer as *the cause* the condition which is perceived as responsible. When there is no salient "responsible" condition, the cause happening last is considered *the cause* as it completes the jointly sufficient set of conditions. Under this approach, different causative constructions assume the same notion of causation (cf. Bar-Asher Siegal & Boneh 2019, Lauer & Nadathur *forthcoming*), which can be formalized in terms of the structural equations model (=SEM) approach based on Pearl (2000), but inevitably involve Causal Selection when it comes to a particular situation, i.e. a particular causal factor has to be selected as *a* or *the* cause depending on the given constraints.

Finally, the fact that overt causatives are always more permissible than change-of-state verbs in selecting the cause can explain the asymmetric entailment relation that was observed in the linguistic literature.

SELECTED BIBLIOGRAPHY: Baglini & Bar-Asher Siegal. 2019. Direct causation: A new approach to an old question. *U. Penn WPL* 26; **Bar-Asher Siegal & Boneh**. 2019. Sufficient and Necessary Conditions for a Non-unified Analysis of Causation. *WCCFL* 36; **Beebee** 2004. Causing and Nothingness, in *Causation and Counterfactuals*; **Icard, Kominsky & Knobe** 2017. Normality and actual causal strength. *Cognition* 161 **Lauer** & **Nadathur**. forthcoming Causal necessity, causal sufficiency, and the implications of causative verbs. **Lewis**. 1973. Causation. *Journal of Philosophy* 70; **Mill.** 1884. *A system of logic*; **Pearl**. 2000. *Causality: Models, reasoning, and inference*; **Wolff**. 2003. Direct causation in the linguistic coding and individuation of causal events. *Cognition* 88.