

The contradiction puzzle for logicity¹

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Abstract. We submit a new puzzle for logicity. It has been argued that the logicity of language is reflected both in the exclusion of contradictions and tautologies, and in the tendency to maximize information in various interpretive phenomena, such as scalar implicatures. We discuss that these two lines of research take on different and intimately conflicting notions of information. This becomes apparent when we focus on contradictions, that are treated as uninformative on the first line, but would qualify as (maximally) informative assuming the second. We suggest that a more adequate and unitary notion of information for logicity is halfway between the one famously introduced by Bar-Hillel and Carnap and the one defended more recently by L. Floridi, namely stronger than the former but weaker than the latter. Adopting this solution, both tautological and contradictory constructions turn out to be uninformative, but for different reasons. This, in turn, grounds the novel prediction of a differentiated speaker reaction as a function of whether the triviality in question is a contradiction or a tautology, both in grammatical and in ungrammatical cases.

Keywords: logicity of language, information, grammaticality, implicatures.

1. The logicity of language

In recent decades, linguistic research has witnessed the emergence of a hypothesis that is as fascinating and promising as it is bold and controversial: the logicity of language (cf. e.g. Barwise and Cooper, 1981; von Fintel, 1993; Gajewski, 2002; Chierchia, 2013; Del Pinal, 2019). The aim of this paper is to highlight a potential tension between two conceptions of information implicitly assumed in the literature on logicity—as applied to the syntactic exclusion of contradictions and tautologies, and to the information maximization observed in various interpretive phenomena, such as scalar implicatures—and to argue for one of two possible solutions.

Opposing to the traditional perspective according to which meaning considerations are irrelevant to determining the possible structures of a language, the logicity hypothesis has developed the idea that behind the unacceptability of many types of linguistic constructions lie reasons of a semantic nature. Several authors proposed that the formative mechanisms of language exclude linguistic constructions that, although technically interpretable in a Montagovian sense, are associated with (irremediably) trivial truth-conditions—that is, tautological (always true) or contradictory (always false)—and that this is why speakers judge them unacceptable, or at least highly deviant. Typical examples in the literature include the following constructions:

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- (1) *There is every fly in my soup (Barwise and Cooper, 1981)
- (2) *Mary is taller than no student is (Gajewski, 2008)
- (3) *At least zero students smoked (Haida and Trinh, 2020)

- (4) *Some students but John smoke (von Fintel, 1993)
- (5) *There are any cookies left (Chierchia, 2013)
- (6) *How fast didn't you drive? (Fox and Hackl, 2006)

Once these structures are analysed using standard semantic tools, and commonly accepted logical principles, it becomes clear that their semantic content is tautological (this is what happens in (1)-(3)) or contradictory (this is what happens in (4)-(6)). For example, the content expressed by the first structure can be demonstrated to ultimately correspond to something like *Every fly in my soup is a fly in my soup*, which is always true (even in empty domains), while the content expressed by the fourth structure corresponds to something like *Some students smoke and no students smoke*, which is never true. Importantly, the triviality of such structures can be purely derived from their deep logical representation (the meaning of descriptive terms like “students” appears to play no role)—that is, their contradictory or tautological nature depends exclusively on the relations among the functional terms of language (cf. Gajewski, 2002, 2008).

The mechanism responsible for determining the possible structures of language would thus be endowed with the ability to recognise those linguistic constructions that are true/false in all situations (in all possible worlds), and which, as such, would be excluded by speakers as unacceptable. Regarding the ultimate motivation behind this exclusion, the underlying idea—more assumed than explicitly stated—appeals to a supposed sensitivity of the language system to the informativeness of linguistic structures: (1)-(6) would be excluded from the set of expressive possibilities not strictly because they are true/false in all possible worlds, but because—as such—they would be non-informative.

As it is clear, the logicity hypothesis has to respond to the objection that it would exclude literally trivial utterances that are, however, evidently acceptable, such as “It is raining, and it is not raining”. A convincing response involves assuming that grammatical trivialities—unlike (1)-(6)—are susceptible to reinterpretations of the nonfunctional material that can render them contingent (i.e. true in some worlds and false in others) and, as such, informative, at least in principle. To make an example, the aforementioned contradictory structure could be reinterpreted as *It is raining and not raining too much*, which can be explained by hypothesising that the logical form of linguistic constructions contains a modulation operator (called *Rescale*) that allows for the constrained reinterpretation (strengthening or weakening) of the meaning of the descriptive terms serving as its arguments, such as in this case the predicate “rain” (Del Pinal, 2019, 2022, 2025; Pistoia-Reda and San Mauro, 2021; Pistoia-Reda and Sauerland, 2021; Sauerland, 2014a). In ungrammatical cases, on the other hand, there is no way to restore the informativity of structures, including by applying arbitrary reinterpretations.

In the logicity literature, this putative sensitivity to the informativeness of linguistic structures is also treated differently—in a way that only apparently is in obvious agreement with the preceding characterisation. Here, the idea is that in various interpretive mechanisms, such as scalar implicatures, a preference is observed for interpretations that are “compatible with fewer situations” (Chierchia, 2013: 24), and, as such, more informative. To illustrate this point, it is

first important to clarify that we are assuming a grammatical account of scalar implicatures, according to which they are processed semantically rather than determined through linguistic interaction *via* violations of conversational maxims (cf. e.g. Chierchia et al., 2012; Fox, 2007; Magri 2009, 2011). More specifically, this account posits the presence, within the logical form of scalar structures, of an exhaustivity operator akin to exclusive “only”, leading to the interpretation of a scalar structure like “John ate pasta or broccoli” as *John ate pasta or broccoli, and John did not eat pasta and broccoli*—where the scenario in which John ate both pasta and broccoli has been excluded—or, in other words, as *John ate pasta or broccoli, but not both*. Indeed, the exclusive interpretation is true in fewer situations than the inclusive one, (which also includes the scenario where John ate both).

Confirmation of this innate tendency to information maximization comes from the observation that in downward entailing environments—for example, those in which a scalar structure is embedded under negative predicates like *doubt*—the inference toward the exclusive interpretation is blocked, or at least it is not preferred over the inclusive interpretation. For instance, in “Ann doubts that John ate pasta or broccoli”, the disjunction is preferably interpreted inclusively. The grammatical account explains this fact in terms of the aforementioned tendency, since in this case the interpretive mechanism activated by the exhaustivity operator would yield a less informative interpretation—namely, *Ann believes that John ate neither pasta nor broccoli, or ate both pasta and broccoli*—compared to the interpretation obtained if the operator is assumed to be inactive, i.e., *Ann believes that John ate neither pasta nor broccoli* (equivalent to the literal interpretation of the original scalar structure).

2. The contradiction puzzle for the logicity of language

As already noted in Pistoia-Reda (2024), the tension between the two conceptions of information implicitly adopted in the two lines of logicity—one on the exclusion of contradictions and tautologies, the other on information maximization—becomes evident when one focuses on contradictions. Following the first line, they are noninformative, because they are false in all possible worlds. Following the second line, they are maximally informative, because they are true in no possible worlds, thus excluding more alternatives than any other construction, and therefore emerge as *a fortiori* informative, contrary to the first line. Conversely, tautologies do not seem to generate similar conflicts. Following the first line, they are noninformative, because they are true in all possible worlds. Following the second line, they are minimally informative, because they are true in all possible worlds, thus excluding fewer alternatives than other constructions, which is compatible with their being noninformative, in accordance with the first line.

The source of the tension, in other terms, appears to lie precisely in the question of whether contradictions should be taken as informative. Intuitively, it is indeed easier to account for the noninformativeness of tautologies. Imagining “what is the case” (as in Wittgenstein’s *Tractatus*) if “It is raining or it is not raining”, we end up imagining any possible situation, since all are consistent with the content expressed by such structure. “Obviously!” seems to be our natural reaction to a tautological content. It is as if we start evaluating what the structure tells us about the world, only to discover that it informs us of *nothing new*: it does not determine the current state of the world, but merely tells us that it is one among all possible worlds. By contrast, in the case of a contradiction like “It is raining and it is not raining”, we simply cannot imagine any possible situation that is compatible with the content expressed by

this structure. “What?!” is our first reaction, and we are immediately led to perform a reinterpretation. Here, we find that the sentence does not inform us *of anything*: it fails to determine the world *at all*. Though both cases result in our learning nothing about how the world is, the reasons for this outcome appear different: with tautologies, it seems we lack *new* information; with contradictions, we lack information *tout court*.

It may be interesting to note that Wittgenstein himself, while famously asserting in the *Tractatus* that both tautologies and contradictions “say nothing” (TLP 4.461), only about the former claimed that they “add nothing to our knowledge” (“For example, I know nothing about the weather if I know that it is raining or not raining”, *ibid.*). The question of the informativeness of contradictions, in fact, has been widely debated in the philosophical literature. The principle assumed in the second line of logicity—that information is directly proportional to the number of alternatives (of worlds) excluded—has been upheld by numerous authors (cf. e.g. Ramsey, 1927; Popper, 1934/59; Shannon, 1948; Hintikka, 1962; Rumfitt, 2008) and is likely implicitly assumed in the *Tractatus* (cf. Negro, 2017; Frascolla, 2018). Equivalently, the principle can be framed as an inverse relationship between the information of an utterance and its probability—the Inverse Relationship Principle (cf. Barwise, 1997)—as in Bar-Hillel and Carnap’s (1953) Classical Theory of Semantic Information. The latter readily accepted the consequent (maximal) informativeness of contradictions, distinguishing the notion of information from that of truth. Others, however, have highlighted the counterintuitive and paradoxical nature of this conclusion, thus accepting the Inverse Relationship Principle but against the backdrop of a strong notion of information (cf. e.g. Floridi, 2004; cf. also Dretske, 1981), according to which information, like knowledge, is *factive*: only true utterances carry information (Veridicality Thesis). Thus, both tautologies and contradictions are classified as noninformative, but for different reasons: the former because they exclude nothing; the latter because, though they exclude something, they exclude too much to be true (and are thus false).

3. A possible solution to the contradiction puzzle for the logicity of language

A first possible solution to the tension highlighted in the previous section would consist in accepting the Classical Theory of Semantic Information, its Inverse Relationship Principle, and consequently the (maximal) informativeness of contradictions. By doing so, the second strand of logicity would remain intact; at first glance, it would even appear confirmed by what has been shown in relation to the contextual blindness of scalar implicatures—namely, the fact that scalar implicatures can be generated including when they generate contradiction with the shared body of knowledge and with contextually known empty domains (cf. Magri, 2009, 2011, 2016, 2017; Pistoia-Reda, 2017; Buyko et al., 2024; cf. also Del Pinal, 2021; Bassi et al., 2021). However, the first strand would need to be completely revised, since tautologies and contradictions would no longer be *both* noninformative. Given that speakers judge both tautological constructions like (1)-(3) and contradictory ones like (4)-(6) as unacceptable, to preserve logicity one would need to identify another property that is (i) logical; (ii) shared by both types of constructions; (iii) different from being true/false in all possible worlds. Admittedly, this solution appears non-obvious and hardly viable, if only because the discovery that (1)-(6) have trivial truth-conditions built on decades of research.

The solution we instead intend to defend aligns with the accounts *à la* Floridi. We advocate adopting the Inverse Relationship Principle, to define the greater or lesser informativeness of structures, alongside a *Veridicality Requirement* that treats as informative only utterances that *can* be true. This solution does not require assuming the factivity of information and thus

weakens Floridi's Veridicality Thesis.

- (a) A linguistic structure is informative only if it is true in at least one possible world.
- (b) The quantity of information is directly proportional to the number of alternatives excluded.

If one adopts this solution, the first strand of logicity would remain intact, since both types of trivial constructions would prove noninformative: contradictory ones, because they fail to satisfy the necessary condition stipulated in (a); tautological ones, because, according to (b), the quantity of information produced would be proportional to zero—that is, null. The second strand, on the other hand, would still represent a coherent proposal, with the contextual blindness of scalar implicatures posing no obstacle, since upon closer examination this does not imply that contextually mismatching inferences are generated *because* they lead to contradictory interpretations, but rather *despite* leading to contradictory interpretations. In other words, from this perspective, no explanatory role is assigned to the informativeness of contradictions.

Beyond filling a gap in the logicity literature—namely, providing the first explicit account of the specific notion of information that is implicitly assumed in the literature—this solution shares with the accounts *à la* Floridi the advantage of being in remarkable agreement with the widely shared intuition that both tautologies and contradictions are noninformative, but in different senses: with the former we have no new information, with the latter we have no information whatsoever. This particular point, moreover, would allow for the novel prediction of a differentiated speaker reaction as a function of whether the triviality in question is a contradiction or a tautology. And, indeed, we speculate that, in grammatical cases, tautologies are less prone to reinterpretations and, in ungrammatical cases, contradictions such as (4)-(6) are more strongly rejected than tautologies such as (1)-(3). The results of such a study could provide valuable insights about the role played by information within logicity, and especially about what makes the modulation mechanism more or less “natural” (Chierchia, 2021: 235).

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