Analogical Relatedness Between Exemplars of Schema-Governed Categories

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Abstract

The traditional perspective on analogical thinking has shown that relational similarity is key in determining analogical relatedness, outweighing entity similarity. However, evidence supporting this perspective comes from studies where the combination of the elements composing the compared facts does not activate schema-governed categories whose mismatch could compete with similarity between relations during the evaluation of analogical relatedness. In Experiment 1, we assessed the relative impact of common category membership and relational similarity on judgments of analogical relatedness. Pairs of events where only a common category was present received higher scores than pairs where neither a common category nor similar relations were present, and also than pairs maintaining only similar relations. In Experiment 2, we examined the extent to which judgments of analogical relatedness were affected by whether the compared situations fared similarly along relevant dimensions of the schema-governed categories to which they belonged. Ratings were higher for pairs where the analogs matched compared to pairs where they did not match. We concluded that in comparisons in which at least one of the events activates a schema-governed category, people assess analogical relatedness through criteria that depart from those postulated by traditional studies.

Keywords: analogy; schema-governed categories; similarity; relations

Introduction

Assessing the extent to which two situations can be considered analogous represents a crucial step in deciding whether knowledge about the better-known situation (*base analog*) can be sensibly projected onto the lesser-known situation (*target analog*) (Gentner et al., 1993; Holyoak & Thagard, 1995). As with the modeling of other high-level cognitive activities, the base and target situations are assumed to be represented in terms of *entities* (single elements that stand for individuals or objects; e.g., John and table, respectively), *attributes* (unary predicates representing properties of entities; e.g., WOODEN (table)), and *relations* (multiplace predicates that link two or more arguments (PAINT (John, table)) or two or more lower-order relations; e.g., CAUSE (PAINT (John, table), EMBELLISH (John, table)).

Since the 1980s, several cognitive scientists (e.g., Gentner, 1983, 1989; Holyoak & Thagard, 1989, 1995) have proposed that the most representative exemplars of the concept of *analogy* are those comparisons in which two situations share a system of relations (i.e., lower-order relations governed by higher-order relations). However, single-relation comparisons like those employed in the present study have also been accepted as analogies in the psychometric tradition (e.g., Raven et al., 1962), in research on the development of analogical thinking (e.g., Goswami, 2001; Richland et al., 2006), in experiments with adults (Gentner & Kurtz, 2006) and in computational simulations (Hummel y Holyoak, 1997).

A traditional and widely accepted consensus exists that two situations are judged to be analogous to the extent that they include similar relations, regardless of eventual differences between the entities playing the same roles in the base and the target. According to structure-mapping theory, non-identical relations can be put in correspondence as long as they can be re-represented in identical terms, either via *minimal ascension* (finding an immediate common superordinate along an IS-A hierarchy, Falkenhainer, 1990), or via *decomposition*, which consists in breaking down relations into more basic components to reveal shared identical semantic elements (Yan et al., 2003).

Evidence for the role of relational similarity and re-representation during judgments of analogical relatedness was obtained in studies dealing with systems of relations (e.g., Gentner et al., 1993; Silliman & Kurtz, 2019) as well as with single relations (Gentner & Kurtz, 2006). To illustrate, Gentner and Kurtz (2006) asked participants to give timed answers to whether a base item (e.g., "John *bought* the candy") was analogous to target items that were similar or different from the base in terms of relations ("John *took* the candy"/"John *stepped on* the candy") or in terms of entities ("John bought the *sandwich*"/"John bought the *bookshelf*"). Judgments of analogical relatedness were highly sensitive to the degree of relational similarity, but hardly affected by entity similarity. Moreover, response times for analogical acceptance involving similar verbs were longer than those associated with synonymous verbs, lending support to the thesis that re-representation was at play in the former case.

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Although similarity between relations seems critical for certain types of analogies, this condition may prove neither necessary nor sufficient for comparisons between exemplars of *schema-governed categories* (SGCs, Markman & Stilwell, 2001), a kind of analogy that pervades everyday reasoning (Oberholzer et al., 2018; Olguin et al., 2022; Raynal et al., 2020). To illustrate, imagine a variation of the above set from Gentner and Kurtz (2006) wherein *candy* was replaced by *passport.* Although *buying candy* and *taking candy* would be judged as analogous, *buying the passport* and *taking the passport* would probably not be, on the grounds that the base analog constitutes a case of *crime*, whereas the target does not. With these replacements, the action and the entity in the base analog leads to a construal that is not elicited by the target, and this mismatch now competes with the similarity between the meanings of *buy* and *take*, something that does not occur when *candy* fulfills the role of object. As illustrated by this example, when more global interpretations come into play, similarity between relations might not represent a *sufficient* criterion to accept that two events are analogous. Taking this reasoning one step further, in this kind of analogy the similarity between relations may even be *unnecessary* for two facts to be considered analogous. Making variations on the above set, "John bought the passport" and "Peter altered the passport" could be considered analogous on the grounds that they are exemplars of *crime*, even though *buy* and *alter* do not share any meaningful similarity, and any resemblance that might exist at a highly abstract level bears no relevance to the concept of committing a crime[1].

A SGC describes the semantic structure of a category of events (e.g., *love expression, action slip,* or *betrayal*) in terms of a network that connects the components of those events (Gentner & Kurtz, 2005; Goldwater et al., 2011; Markman & Stilwell, 2001). Take, for example, the relational category *expression of love,* which could include (a) an agent experiencing love, (b) an action that shows generosity, (c) a patient that is capable of experiencing romantic emotions, and (d) an object that is pleasant for the patient. Akin to Bassok and Medin's (1997) *semantic dependencies*, the network also stipulates how the elements assigned to a slot constrain the elements that can be bound to other slots. If a particular expression of love involves *buying,* the object could be flowers but not a hammer. But if the verb is to *invite,* a suitable entity might be a restaurant but not a cemetery. Given the high degrees of freedom with which action-entity combinations can yield instances of a SGC, we suspected that the contribution of relational similarity to analogical relatedness between exemplars of SGCs could be less important than in analogies where compared facts do not constitute exemplars of SGCs.

Oberholzer et al. (2018) showed that an event that would not naturally elicit a given SGC can be recategorized as an exemplar of such SGC when analogically compared to a more typical exemplar. Crucially, they found that relational similarity between base and target was not a necessary condition for such re-categorization. In the same vein, Minervino et al. (2023) demonstrated that analogical inference-making does not always involve copying base relations onto the target; this process often entails identifying new instances of the base item's SGC, irrespective of whether the relations involved in these new instances are similar to those of the base event. No prior research on SGC exemplars, however, has directly examined the role of relational similarity in judgments of analogical relatedness.

In our first experiment, we aimed to test whether belonging to the same SGC could serve as an alternative to relational similarity when judging analogical relatedness. To do so, we compared ratings of analogical relatedness for base and target events that shared a SGC but not similar relations with those for events that shared neither of them. Contingent on a positive effect of SGCs on judgments of analogical relatedness, a second objective of Experiment 1 was to compare its strength to that of the similarity between explicit relations. To this end, a condition where events shared a SGC but lacked similar relations was compared against a condition where events included similar relations but did not belong to the same SGC.

The present study was also interested in unveiling the kinds of similarities that determine more fine-grained appraisals of the extent to which exemplars of SGCs are seen as analogous. In other studies dealing with exemplars of SGCs (e.g., Tavernini et al., 2017; Minervino et al., 2023), both the retrieval and inference stages of analogical reasoning proved sensible to the extent to which the base and target exemplars fare similarly along critical dimensions of the SGC to which they belong (for example, two wars could differ with respect to duration, bloodiness or fairness). Drawing on this preliminary evidence, Experiment 2 was designed to address the extent to which exemplars' similarity along relevant dimensions of their overarching SGC also modulates explicit judgments of analogical relatedness.

Experiment 1

Method

Participants and Design Eighty participants with ages 18 to 59 who had completed high school-level education volunteered to participate in the experiment. The variables *similarity of relations* and *presence of a shared SGC* received within-subjects manipulation. The dependent variable was the degree to which participants considered that the target situation was analogous to the base event.

[1]Re-representation mechanisms proposed by the structure-mapping theory operate on isolated pairs of base and target relations. The only similarity between *buy* and *alter* that we can find is that both verbs involve a change in the state of something. This is the kind of extremely abstract and vapid shared meaning that makes people reject two verbs as being similar. *Crime* does not constitute one possible meaning of *buy* nor *alter* in any real or mental dictionary, not even as a figurative option. Rather, it is the whole fact what activates this relational category, whose meaning severely departs from the specific actions involved in these exemplars of the category.

Materials Twelve sets of materials were built, each one comprising an instance of a SGC serving as base item (e.g., "The bouncer denied entry to the transgender girl"; an instance of *discrimination*) and four target items that resulted from factorially combining (1) whether the target shared a SGC with the base, and (2) whether its relation was similar to that of the base. Sticking to the base analog from the above example, while the same-category item involved an instance of *discrimination* whose verb was not similar to *deny* ("The bouncer *facilitated* entry to European-looking people"), the relationally similar target was not a case of *discrimination* but featured a relation that resembled that of the base item ("The bouncer *refused* entry to the drug dealers"). The remaining target items either maintained similar relations and SGCs with the base item ("The bouncer refused entry to indigenous-looking people") or else did not maintain any of the above similarities with the base ("The bouncer facilitated entry to the paramedics").

Table 1: Sample sets of materials, Experiment 1

Set 3 SGC: renovation	B: The artist *decorated* part of the police station T_r: The guerilla *painted* part of the police station T_c: The bricklayer *demolished* part of the police station T_{r+c}: The policeman *painted* part of the police station T_{ns}: The prisoner *demolished* part of the police station
Set 7 SGC: superstitious behavior	B: Sanchez *knocked on* wood before Messi kicked the penalty T_r: Gómez *moved* the antenna of the TV before Messi kicked the penalty T_c: Gómez *lit* a candle before Messi kicked the penalty. T_{r+c}: Gómez *moved* the stamp of Gauchito Gil before Messi kicked the penalty T_{ns}: Gómez *turned on* the speaker before Messi kicked the penalty.
Set 10 SGC: disrespectful behavior	B: Lorenzo *defecated* in the park's flowerbed T_r: Bruno urinated in his house's bathroom T_c: Bruno *whistled* at the funeral T_{r+c}: Bruno *urinated* in the corner of the classroom T_{ns}: Bruno *whistled* in the street

Note. B: base; T: target; r: similarity in relations; c: common SGC; ns: no similarity. In the original Spanish version**,** Set 7 included the same verb: "encender."

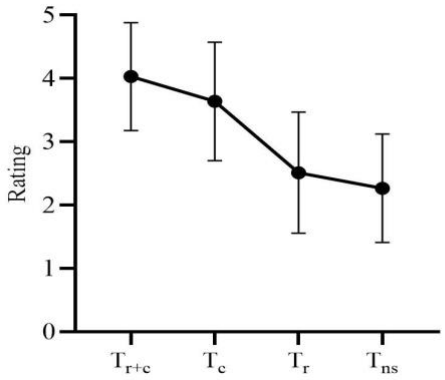
In comparisons involving dissimilar relations, the verbs did not exhibit any meaningful resemblance, such that no re-representation mechanism could arrive at a shared meaning or, more importantly, at the SGC that the events might share when considered as wholes (e.g., *deny* and *facilitate* are extremely different, and *discrimination* is not a superordinate for these verbs; for more examples, see Table 1). All target analogs were identical to the base analog in terms of their propositional structure. While in the above set we manipulated the presence of a shared SGC by selecting appropriate fillers for the patient role, in the remaining sets we focused on other roles, such as the agent, object, or location. The entities that varied across the target items were never similar to their corresponding base entities. Table 1 displays 3 of the 12 sets of materials employed in Experiment 1.

Procedure Participants received a link to a Google form via email. Upon signing an informed consent for participation, they read a general instruction stating that they would receive 12 pairs of sentences describing simple events, and that for each pair they would have to employ a 5-point Likert scale (1 = not analogous, 5 = very analogous) to express the extent to which they considered that the second event was analogous to the first. Participants received only one pair from each set, and three trials per condition. The presentation order of sets and conditions was counterbalanced.

Results and Discussion

Figure 1 displays the average analogical relatedness ratings across all conditions. To examine the effects of relational similarity and shared SGC membership on judgments of analogical relatedness, we conducted a 2 (similar relations: present, absent) × 2 (shared SGC: present, absent) ANOVA on participants' ratings. The analysis revealed significant main effects of similar relations, $F(1, 312) = 3.93$, $p < .05$, and of shared SGC membership, $F(1, 312) = 91.56$, $p < .001$. The interaction between factors was not significant, $F(1, 312) = 2.14$, $p > .05$.

Figure 1: Average ratings per condition, Experiment 1



Note. r: similar relations; c: shared SGC; ns: no similarity. Vertical lines represent standard deviations.

Among pairs with dissimilar relations, those sharing a SGC (M = 3.64, SD = 0.94) received higher ratings of analogical relatedness than those that did not share a SGC (M = 2.27, SD = 0.85), $t(79) = 9.12$, $p < .001$, $d = 1$. This confirms that when at least one member of a pair belongs to a SGC, shared category membership can serve as an alternative criterion to relational similarity for evaluating analogical relatedness.

We next assessed the relative strength of relational similarity and shared SGC membership as determinants of analogical relatedness. Pairs sharing only a SGC (M = 3.64, SD = 0.94) were rated as more analogous than pairs sharing only similar relations (M = 2.52, SD = 0.96), $t(79) = 7.54$, $p < .001$, $d = 0.84$. This suggests that when at least one member of a pair belongs to a SGC, shared category membership exerts a stronger influence on judgments of analogical relatedness than relational similarity alone.

Finally, we examined whether relational similarity still enhances judgments of analogical relatedness when a shared SGC is already present. Pairs sharing a SGC plus similar relations (M = 4.03, SD = 0.85) received higher ratings than those sharing only a SGC (M = 3.64, SD = 0.94), $t(79) = 3.22$, $p < .001$, $d = 0.36$. This indicates that relational similarity contributes to judgments of analogical relatedness even when the compared situations already share membership to a SGC.

To rule out the possibility that ratings were influenced by a task demand to demonstrate sensitivity to shared category membership, we tested whether ratings changed systematically over time. A linear mixed-effects model with trial order and condition as fixed effects and participant as random intercept revealed no significant effect of trial order on ratings of analogical relatedness, β = -0.013, SE = 0.013, t = -0.99, $p > 0.05$, suggesting that the previously reported effects were not driven by an increasing attention to the SGC.

One reason why comparisons between events that share a SGC rated higher than those based only on similar relations might be that exemplars of a common SGC share not only single relations, but entire systems of relations. For example, *expression of love* refers to any behavior that conveys affection toward someone. These expressions help build emotional bonds and let others know they are loved. This could be a propositional representation of the SGC:

1. BUILD (agent, EMOTIONAL (bond), patient)
2. COMMUNICATE (agent, EMOTIONAL (attachment), patient)
3. CAUSE (proposition 1, proposition 2).

Just as Gentner and Kurtz (2005) acknowledge having failed to reduce other SGCs to systems of relations, we did not succeed in representing this nor any of the remaining SGCs employed in the current materials. In this example, the shared system CAUSE (BUILD, COMMUNICATE) is meaningless without including the entities and their properties. As such, relying on this vacuous system of relations cannot offer an advantage over similar relations when assessing analogical relatedness.

Having established the contribution of SGC co-membership to participants' judgments of analogical relatedness, in Experiment 2 we examined the extent to which these ratings are sensitive to specific values of the compared exemplars along relevant dimensions of their shared SGC.

Experiment 2

Method

Participants and Design Eighty participants with ages 19 to 67 who had completed high school-level education volunteered to participate in the experiment. The degree to which the base and target situations fared along a relevant dimension of their shared SGC received within-subjects manipulation. The dependent variable was the extent to which participants considered that the target situation was analogous to the base.

Materials Twelve sets of materials were built, each one comprising three exemplars of a SGC. While in six sets the base analogs displayed a high value along the manipulated dimension (e.g., "The boy ingested a glass of water with rat poison", an instance of *accident* ranking high in terms of *severity*), in the other six they displayed low values. Within each set, while one of the target exemplars matched the base situation along a relevant dimension of their shared SGC (e.g., for the previous base analog, "The little girl fell from the balcony"), the other target did not (e.g., "The little girl fell from the high chair"). Target items from a given set were identical to each other in terms of propositional structure and semantic content, except for the entity associated with the manipulated dimension of the SGC. As in Experiment 1, the role affected by the manipulation varied across sets. Table 2 displays a sample of the materials employed in Experiment 2.

Table 2: Sample sets of materials, Experiment 1

Set#3 SGC: contravention Dimension: severity	B: Peter made a U-turn in a non-urban gravel road T_m: Steve parked his car blocking the entrance to his own garage T_{nm}: Steve parked his car blocking the entrance of ambulances
Set#9 SGC: lucky event Dimension: importance	B: George won 1kg of ice cream at the ice-cream parlour T_m: Larry found a gold bar at an abandoned shed T_{nm}: Larry found a new ball-pen at an abandoned shed
Set#4 SGC: athletic feat Dimension: greatness	B: The kid crossed the Nahuel Huapi lake swimming T_m: The elderly man swam across the Nahuel Huapi lake T_{nm}: The athlete swam across the Nahuel Huapi lake

Note. B: base item; T: Target; m and nm: matching and non-matching in dimension, respectively.

Procedure Volunteers received a link to a Google form via email. Upon signing an informed consent for participation, they read a general instruction stating that they would receive 12 pairs of sentences describing simple events, and that for each pair they would have to employ a 5-point Likert scale (1 = not analogous, 5 = very analogous) to express the extent to which they considered that the second event was analogous to the first. One of the alternative booklets of materials (Booklet A) comprised six pairs that matched along a relevant dimension of their common SGC and six pairs that did not match along said dimension, arranged in random alternation. The alternative array (Booklet B) comprised the complementary targets of each set. All 12 pairs were taken from different sets, and the presentation order of the sets was counterbalanced.

Results and Discussion

Ratings of analogical relatedness were higher when members of a shared SGC matched along a critical dimension of the category ($M = 3.35$, $SD = 0.63$) than when they did not match ($M = 2.77$, $SD = 0.61$), $t(79) = 6.92$, $p < .001$, $d = 0.77$. This finding suggests that the criterion used to evaluate analogical relatedness between exemplars of SGCs differs from the criterion posited by the structure-mapping theory (similarity in paired explicit relations). When events are interpreted as instances of a shared relational category, judgments of analogical relatedness appear to hinge in part on how the exemplars compare along dimensions known to be relevant to that category.

It should be noted that the values on these dimensions could be understood as *attributes* of events that constitute exemplars of SGCs and not as attributes of entities, as traditionally conceived. For example, in the *contravention* set, severity (e.g., minor vs. major) represents a relevant attribute in both the base and the target taken as wholes. To evaluate such analogies, the cognitive system appears to assign the event to a SGC, to identify salient category dimensions, and to assess how each exemplar fares along them.

General Discussion

Focused on analogies where at least one of the compared events is an exemplar of a SGC, Experiment 1 demonstrated that the dominant criterion for determining whether two events are analogous does not involve similarity between the explicit relations included in the descriptions of the events. Rather, it consists in determining whether the compared situations belong to the same SGC. In our second experiment, we found that two exemplars of a SGC are judged as more or less analogous depending on how closely they fare along relevant dimensions of the SGC to which they both belong. Taken collectively, the results suggest that while belonging to the same SGG constitutes an alternative criterion to the similarity of relations when it comes to accepting two events as analogous, the perceived degree of analogical relatedness is importantly modulated by the extent to which the events match along relevant dimensions of the category.

In the present experiments, both membership to a SGC and the values along dimensions of the SGC were manipulated by way of selecting appropriate entities for roles such as agent, patient, object, or location. For example, in those conditions of Experiment 1 having similar relations, what determines the membership of the target item to the base SGC has to do with which entity plays the role of the patient in the action of refusing the entry to a place. We would have another case of discrimination if it is a minority who suffers from an unfair treatment, but not otherwise. With regard to values along SGC dimensions, an episode where a child falls to the floor will constitute a significant accident if falling from a high location, and a minor accident if falling from a low altitude. When assessing analogical relatedness between exemplars of SGCs, the entity similarities that count do not consist in decontextualized, general similarities of the kind that could be provided by general knowledge networks. Instead, people take into account those aspects of entities that become relevant as an effect of the SGC that is framing the comparison. In the above example, the height of a place from which someone falls becomes relevant because it affects whether the event in fact constitutes a domestic accident and, in those cases where it does, because it affects the severity of the accident.

The standard approach to analogical thinking might posit that the results obtained in our experiments do not represent a real challenge to the idea that the only factor that counts in evaluating analogical relatedness is the similarity between relations. It could be argued that the analogical machinery was not designed to carry out the task of interpreting the meaning of the events that will take part in a comparison, something that corresponds to a pre-analogical stage wherein the initial representations of those events are constructed (see e.g., Morrison & Dietrich, 1995). Thus, recognizing an event as an instance of a SGC and indexing it in terms of how it fares along relevant dimensions of said category would constitute a previous mental operation that falls outside the scope of any theory of analogical reasoning (Holyoak et al., 1994). Participants' judgments of analogical relatedness would therefore take as input these more meaningful construals of the facts being compared and not the superficial, low-level representations where we find poorly informative relations.

For this argument to hold, the standard approach should be able to show that the semantic structure of the SGC shared by the two exemplars can be fully captured by a relation (i.e., a multiplace predicate). To illustrate, consider the following two expressions of love: "John prepared his wife's favorite meal" and "Lorenzo sent his girlfriend a love emoji". This constitutes our best attempt to represent these events in terms of the same relation:

EXPRESS (John, love, wife)

EXPRESS (Lorenzo, love, girlfriend)

As we were forced to include the concept of *love* as an argument of the relation EXPRESS, we have failed to reduce the category *expression of love* to a relation.

The standard approach could still contend that, prior to the activity of evaluating the comparison, people detect the SGC to which each of the analogs belongs and describe said SGC by means of a relational predicate that can include all kinds of elements (e.g., actions, entities, and properties of entities). This perspective could posit that there is no commitment to having the relational predicate correspond to a single word in a particular natural language (e.g., a verb), as the identification of a relation is not limited by the means that a particular language offers to describe it. Therefore, the initial representations of the analogs could take the following form:

EXPRESS-LOVE (John, wife)
EXPRESS-LOVE (Lorenzo, girlfriend)

Given these representations, the facts would be considered analogous because they share the relation *express-love*. Furthermore, if we had judged that one of the expressions of love is more committed (a dimension of the SGC) than the other, we could have encoded these values as follows:

INTENSIVELY-EXPRESS-LOVE (John, wife)
MODERATELY-EXPRESS-LOVE (Lorenzo, girlfriend)

As we see it, the proposal that relational predicates can include all types of elements (e.g., actions, entities, values of the event resulting from the action applied to the entity, etc.) voids the meaning of the very concept of *relation*, reducing this notion to "whatever the cognitive system perceived as a relation and then arranged as a predicate in a proposition with two or more arguments". For decades, a way of achieving at least some basic support for the blurry distinction between relations, entities and entity properties has consisted in establishing parallels between those elements and particular units of speech. Relations may be understood as tantamount, but not reducible, to transitive verbs, entities correspond to object nouns, and attributes correspond to adjectives (Silliman & Kurtz, 2019). Two things can be considered analogous when the mapping of two structured representations reveals conceptually similar relations between different entities exhibiting different properties (Gentner, 1983; Gentner & Kurtz, 2006; Holyoak & Thagard, 1989, 1995). If a relation can now be a string that gathers all types of elements, what once was a slippery base now becomes nothing at all.

Instead of what would be a spurious formalist maneuver to assimilate SGC-mediated analogies in terms of the standard concept of relation, we advocate broadening the meaning of relation to include, for example, relational structures such as those captured by SGCs (a case of "*relational* categories"). In these structures, relations represent only one of the relevant constituents, with other thematic roles being just as important. The complex interdependency of the components of a fact that renders it an exemplar of a SGC makes it proper to talk about these categories as "relational", but the sense of the term is broader than that employed by dominant theories of analogy.

A second issue with what the standard approach would reply to the present proposal is the assumption that the analogical machinery can operate with a single representational level that captures the shared abstract meaning of the analogs. A problem with this idea is that it assumes that the interpretations that will be convenient for detecting the analogous nature of the facts can be generated by the system prior to the comparison process (see Hofstadter & FARG, 1995, for a strong opposition to this assumption). This anticipatory capacity proves erroneous in cases where an event is viewed for the first time as an instance of a SGC due to being compared to a more typical exemplar of said category (Oberholzer et al., 2018). For example, an event of *catcalling* can be conceptualized as an instance of *gender-based violence* after being compared to a more obvious case of *sexual harassment*. It also proves erroneous in cases where the value to an event in a dimension of its SGC cannot be assessed prior to the comparison, since determining which dimensions are relevant and how each exemplar scores on them is the result of the comparison rather than an initial condition of the comparison process. While preparing one's partner's favorite meal may be seen as a great expression of love when compared to sending an emoji, it may be seen as a small gesture when compared to gifting your partner a trip to Paris.

The study of concepts has recently witnessed a growing interest in SGCs, long overshadowed by the study of entity or artifact categories (Goldwater & Schalk, 2016; Popov et al., 2020). Just like SGCs, analogical comparisons between exemplars of SGCs are very frequent in everyday life (Olguín et al., 2017, 2022; Raynal et al., 2018). The shift from studying traditional analogies—where abstract categories are the outcome of the comparison process—to studying analogies between exemplars of already established categories will surely take advantage of this growing interest in relational concepts.

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