Schemas, Interactions, and Objects in Meaning-Making[1]

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Sociologists agree that there is something cultural that exists within individuals, in interactions, and in objects. And yet the process through which the culture inside individuals interacts with the culture outside of them is only partially understood and is generally untested. Relying on a novel quasi-experimental design, we investigate how the culture within individuals, interactions, and objects operates in the making of shared meanings. First, we find that cultural schemas set a baseline for shared meanings of objects. Second, we find that shared meanings are also made through interactions, and more vociferously between individuals with shared schemas. Third, we find that objects encoded with meanings set a higher baseline in interpretive clarity than more ambiguous objects. Lastly, we find that schema similarity and interactions jointly lead to greater shared meanings for more ambiguous objects, suggesting that individuals within groups work rapidly toward generating institutionalized and objectified meanings for objects when those assigned meanings do not yet exist. Findings begin to uncover the routine mechanisms of shared meaning creation, pointing toward new empirical frontiers in culture and cognition.

KEYWORDS: cognition; culture; meaning-making; the senses; networks; schemas.

INTRODUCTION

There is a consensus that culture exists within individuals, and that individuals have the capacity to make meanings. Yet despite these general truths, culture may be too vast and complex to live in individuals' heads in any detailed way (DiMaggio 1997; Lizardo and Strand 2010), which has led to the somewhat paradoxical conclusion that "culture is, by and large, not shared" (Martin 2010:240). In this framework, culture is wide and not deep; thus, culture must be able to exist outside individuals, such as in interactions with others or "stored" externally in objects. Yet how these different locations of culture might combine in the making of cultural meanings—which are definitionally shared meanings—has gone generally untested.

Advancements in understanding the constituent roles of the different locales of culture in the making of shared meanings have generally progressed in three main directions. In the first scholars have looked to how schemas—as a "sort of mental shortcut that is especially crucial when faced with conditions of incomplete informa-

tion" (DiMaggio 1997:269)—organize and help to activate shared meanings (Lizardo and Strand 2010; Shepherd 2011; Strauss and Quinn 1997).

In the second, scholars have looked to the interactional bases of culture, be it from a symbolic interactionist perspective (in which "we know things by their meanings, that meanings are created through social interaction, and that meanings change through interaction" [Fine 1993: 64]), or a social networks-centered approach in which cultural elements diffuse through channels of influence (Axelrod 1997; Centola et al. 2007; Goldberg and Stein 2018; Rawlings 2020). In the third research trajectory, scholars have reconsidered the role of objects from "Rorschach inkblots" (i.e., entirely unencoded objects onto which individuals can imprint a vast range of meanings) to things with properties (e.g., materialities, affordances, or encoded aesthetic contents) that may be able to push, nudge, or direct the meanings made from them in some directions and not others (Childress 2017; Griswold 1987; McDonnell 2016). Yet the relationship between how the institutionalized and objectified culture that may be stored in objects may or may not interact with the culture of individuals and interactions is still an open question.

In this article, we outline and test a synthesis of individuals' schemas, group interactions, and objects in meaning-making processes. Building off the work of Cerulo (2018), we do so in the domain of fragrances, using a low-cost experimental design that can be reproduced and adapted in a variety of ways. We find that shared schemas and interactions are engines that drive the creation of shared meanings. Moreover, when presented with deliberately ambiguous objects without already institutionalized shared meanings, individuals within groups—and particularly those with shared schemas—work more rapidly to generate shared meanings.

In addition to our theoretical framework and substantive findings on how culture in its various forms combine in the making of meanings, we believe that a core feature of this work is in providing a novel and readily adaptable approach to inducing cultural schemas and testing their effects across a range of interactional situations and objects. In our discussion, in addition to limitations and ideas for future research, we also consider modifications of our quasi-experimental framework, which may afford several elaborations of our findings.

CULTURE IN INDIVIDUALS, INTERACTIONS, AND OBJECTS

As guided by Mohr et al. (2020), we believe that culture can be derived primarily in individuals, interactions, and objects (see also DiMaggio 1997:273–274; Patterson 2014:11). We discuss the culture housed in these locales in order, with an eye toward how culture within and across them leads to the creation of shared meanings.

Culture in Individuals

There is no doubt that there is something cultural that resides within individuals. While the culture within individuals can take a variety of forms (e.g., attitudes, feelings, collective memories, etc.), in this work, we focus on schemas. As defined by DiMaggio (1997:269), schemas are "knowledge structures that represent objects or

events and provide default assumptions about their characteristics, relationships, and entailments." As knowledge structures, schemas are a "processor of a special kind" (D'Andrade 1995:136) that takes the form of "internalized networks of cognitive associations" (Hunzaker and Valentino 2019:953) and can be used to "facilitate perception, interpretation, and action" (Vaisey 2009:1686). As Strauss and Quinn (1997:90) write, "Once a network of strongly interconnected units has formed, it fills in ambiguous and missing information." Using Kant's (1781) example of a dog, if a hairy, snouted animal, sitting on its hind-legs passed through your peripheral vision, you would think "dog" and could fill out other information about it without further investigation: it could also be small or large, trained or untrained, and mean or friendly, but from how it was sitting and its lack of barking (you know it barks even though it did not bark) you have filled in the pieces to decide the dog is not, at the moment, threatened or threatening. As such, it is through schematic associations that we infer if something fits as a dog, what it might do, and what to expect of it (Cerulo 2010:117). Notably, as schemas fill in around missing information, they can also make sense of nonsense, as is the case with various sensory and perceptual illusions (Mercier and Sperber 2017; Shepard and Cermak 1973).

As seen in the above example, schemas are "mental shortcuts" (Patterson 2014:10) that "allow us efficiently and seamlessly to process sensory input by relying on prior knowledge" (Goldberg 2011:1401). As such they are "learned or innate mental structures that organize related pieces of knowledge" (Strauss and Quinn 1997:49) that are "automatically acquired and updated from patterned activity" (Wood, Stoltz, Van Ness, & Taylor 2018:246), and "used for the purposes of categorization, recognition, and [the] filling-in of missing information" (Mohr et al. 2020:39).[4] This does not, however, mean that all schemas are *cultural*; for a schema to be a cultural schema it must be shared (Frye 2017:947; Taylor and Stoltz 2020:546). In this way, cultural schemas can be thought of as evidence of the "'collective social' at a level below the person" (Lizardo et al. 2020:9; see also Bourdieu 1984:470). As summarized by Boutyline and Soter (2020:27), for a schema to be a cultural schema it must be "common to some social group."

While the "group" that shares a schema can be an interpersonal one, sociologists generally believe that shared schemas are also conditioned on sociodemographic groups. This is the case when the social learning of early childhood socialization instills different nondeliberative *habitus* based on class location (Bourdieu 1984), or when ethnicity, race, and nation are understood as cognitively derived "perspectives on the world rather than entities in the world" (Brubaker et al. 2004). Given that, as Lembo (2020:44) writes, "different trajectories through social space should produce different ways of experiencing" things, the degree to which schemas are situated within groups and do not span across groups—which can be highly variable (D'Andrade 1995; Patterson 2014)—is likely conditioned on the degree to which life experiences are also segregated across groups. Yet, as noted by Lizardo et al. (2020), the degree to which schemas do or do not overlap across groups should be thought of in "only gradations," as "the possibility of persons occupying completely

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[4] While schemas are generally associated with automatic cognition, see Cerulo (2018), Leschziner and Brett (2019), Norton (2020), and Winchester (2016) for alternatives to dual process theories of cognition.

unbridgeable worlds of meaning and experience [is] as an empirical absurdity." This gradation view echoes DiMaggio's (1997:267) observation that if culture is a "grab-bag of odds and ends: a pastiche of mediated representations, a repertoire of techniques, or a toolkit of strategies. . .then we might expect less clustering of cultural elements within social groups, less strong linkages among the elements, and weaker pressures for the exclusion of inconsistent elements."

Thus, we see shared schemas across individuals as potentially setting a baseline for shared meanings when presented with similar stimuli (i.e., the same cultural object). However, this may only set the stage for the shared meanings that are generated through interactions.

Culture in Interactions

The symbolic interactionist perspective sees meaning as derived from the culture within interactions. In advocating for the approach, Blumer (1986:4–5) expressly rejects frameworks in which meaning is believed to be derived through the culture in objects or in individuals, which he refers to as the "dominant views":

> Symbolic interactionism views meaning as having a different source than those held by the two dominant views . . .. It does not regard meaning as emanating from the intrinsic makeup of the thing that has meaning, nor does it see meaning as arising through a coalescence of psychological elements in the person. Instead, it sees meaning as arising in the process of interaction between people.

As the symbolic interactionist understanding of culture is summarized by Fine (1979:737, 744), "cultural content derives its shared social meaning through interaction, rather than through an *a priori* assignment of meaning," such that culture itself is ultimately a "construction based upon the consensual meaning system of [group] members." As made clear by Eliasoph and Lichtermann (2003:782), the point is "not that collective representations are meaningless in themselves," but rather is to "understand how the same widely shared symbols, stories, vocabularies, or codes make different meanings in different settings." Different meanings made in different settings can range from everything from what individualism means in different groups, to how to understand citizenship (Perrin 2005), or what is and is not disrespectful (Lee 2009). As found by Brown-Saracino (2018) across four American cites what it means to be LBQ is derived through interactions in local microcultures that supersede the culture that presumably lives in individuals, such that social interaction "largely crosscuts [sociodemographic] differences within each city, troubling categorical explanations for differences in identity schemas" (292). So, too, might interactions supersede the encoded contents of objects in processes of meaning-making (e.g., Asch 1956; Moscovici 1980:214). In fact, research suggests that individuals may be *particularly* likely to lean on interactions for meaning-making—and the idiosyncratic outcomes in meaning-making that interactions may entail (see McDonnell 2016)—when faced with uncertainty (e.g., Salganik et al. 2006; Sherif 1935), or when interacting within smaller groups over bigger groups (e.g., Guilbeault et al. 2021).

While there may be an independent effect of interaction on meaning-making, there has also been building interest in the meaning-making that occurs across the intersection of culture in interactions and culture in individuals. This rising mutual interest is found across scholarly perspectives; from symbolic interactionism (e.g., Price 2020) to social networks (e.g., Friedkin et al. 2016; Rawlings 2020), and culture/cognition approaches (Cerulo 2009; Ignatow 2007; Srivastava and Banaji 2011). From the interactionist perspective, "while the 'jazz' of social action occurs in interaction," schemas matter too, and the "embodied memories that actors bring with them to the situation…are crucial" (Tavory 2018:123). In this "synthetic interactionism" approach (Fine 1993), emphasis is placed on "avoid[ing] the false dichotomy of the individual versus the group," and, instead, the goal is to "define the ways in which group life depends on individual participation and individual life depends on the impact of groups" (Thompson and Fine 1999:297).

This engagement of scholarly perspectives across the intersection of cognition and interaction is echoed by social network scholars. As summarized by Smith et al. 2020:1), the "cognitive turn in social networks exemplifies the modern conception of the brain as fundamentally reprogrammable by experience and circumstances." This can take the form of friends having more similar neural responses to external stimuli than nonfriends (Parkinson et al. 2018) or shared culture tastes generating friendships (Lewis and Kaufman 2018); either way shared meanings may be more forcefully made through homophilous interaction (Rawlings and Childress 2019). As the relationship between cognition and interaction is explained by Ignatow (2007:129), "people will participate more intensely and for longer durations in groups when the group's discourse is internally structured in ways that are isomorphic with, or 'resonate' with…, elements of the individual's habitus." In turn, from a cognition and symbolic interactionist perspective, borrowing Goffman's concept of "footing," Benford and Snow (2000:614) write that "frames and schemas interact during the course of interaction between two or more individuals, with frames providing an interpretive 'footing' that aligns schemas that participants to the interaction bring with them."

Notably cognition plus interaction can also lead to new cultural meanings and new forms of knowledge as the result of *differences* in schematic associations made by individuals, rather than just similarities. Examples might include Dan Sperber's "infra-individual" cognition framework (Wood et al. 2018), or Wegner's (1987) "transactive memory system" in which knowledge is divided up within groups, who through interaction and keeping track of "who knows what" can retrieve and reassemble it for later use. In turn, because "cultural structures are patterns that are only fractionally contained inside of any one individual" (Norton 2020:51), complicated actions like steering a ship require coordination across individuals who *share* a schema (Hutchins 1995:245).

Interaction, therefore, appears to have both independent effects in giving rise to shared meanings, while also acting as a catalyst in accelerating the shared meanings that are derived through shared schemas. And yet, schemas and interactions must be oriented toward some event or object in the world that provides the source of meaning-making. For this, we look to the culture encoded in objects.

Culture in Objects

Culture may exist directly in objects. Yet for the culture in objects to matter, it must be able to influence the culture in individuals or the culture in interactions. Put another way, the culture in objects must be an "actant" in the making of cultural meaning (Latour 2004).[5] This is not a small claim.

For the most part, treating objects as actants has been outside the scope of many sociological analyses. In the Production of Culture approach, rather than being actants, objects have almost entirely been the acted-upon (i.e., the dependent variable), and in most of the classic reception studies, objects were reduced to a matter of research design: objects were the controlled experimental setting onto which the heterogenous sociodemographically determined culture that lives in individuals was differently imprinted (e.g., DeVault 1990; Katz and Liebes 1990; Shively 1992). Notably this "Rorschach inkblot" approach to objects (Griswold 1987:1110) can also be found in studies in which interaction (rather than individuals) is the predictor variable, as is the case with the 48 unknown songs in the MusicLab experiment in Salganik et al. (2006).

But objects may have more of a say in the meanings made of them. For example, rather than just being inkblots the 48 songs of MusicLab had encoded contents that caused the same songs to become more or less popular across worlds and over time (van de Rijt 2019). This reanalysis can be considered as part of a broader movement to reconsider not only that culture may live in objects but also that the culture that lives in objects may have the power to evoke particular meanings in some individuals and interactions (Griswold 1987:1106).[6] As argued by Mukerji (1997:36), "we should try to approach material culture without reducing objects to instantiations of discourse or realizations of cognitive representations."

More generally, the affordances of objects, due to their materiality (McDonnell 2016; Rubio 2014) or encoded aesthetic contents (DeNora 2000; Wohl 2019) "call out" for some interpretations or actions and not others (Lembo 2020). While objects cannot dictate meanings, their encoded contents can be suggestive of how they should be interpreted and responded to (Jerolmack and Tavory 2014). For example, how to think about crimes is embedded in the semantic structure of newspaper headlines (Cerulo 1998), and although readers of a novel do freely read beyond an author's encoded intentions, they are generally pitched by those intentions in the author's designed interpretive directions (Childress 2017).

From the interactionist perspective, within groups objects can be "charged up" (Collins 2014:28) with particular meanings and significance, such that "objects lie symbolically dormant until their deeper collective significance is activated through their use in interaction" (Peña-Alves 2020:385). Over time, those meanings can stay as local "idioculture" that is specific to the group (Fine 1979), or they can diffuse

[5] As Latour (2004 :75) puts it, the "minimal, secular, nonpolemical definition" of an actant is something that can "modify other act[ants] through a series of trials that can be listed thanks to some experimental protocol."
[6] Notably, Denzin's (1990:1578) formal reply to Griswold (1987) in *AJS* roundly rejected the claim that cultural objects held any internal power, instead advocating for the then-more common view that objects are "inherently ambiguous, open-ended, and multivocal" inkblots onto which any range of meaning can be imprinted.

more widely, such that particular meanings for them become "sedimented into struc-ture" (Busch 1980; Fine 1993), as is the case when an object undergoes a process of "stabilization" in which there is a "narrowing [of] collective understandings of objects to only certain qualities" (McDonnell 2016:225).

Cognition scholars also see this interplay between individuals and objects, such as when D'Andrade (1995; see also Frye 2017) argues that the schematic associations made by individuals are recorded in objects, and it is through those objects that sche-matic meanings are transmitted across populations.[7] As Leschziner and Brett (2021) note, as mental structures schemas can make randomly associative meanings all by themselves, but they are generally *anchored* by the encoded contents of objects and symbols that cue up some schematic associations and not others (see also Swidler 2001; DiMaggio 1997).

The anchoring work of objects may also be variable, as based on how much their meanings have been stabilized and institutionalized, or as based on their ambi-guity such that more ambiguous objects *allow* for more divergent cultural meanings. In Griswold's (1987) analysis, the "cultural power" of an object rests in it being both interpretable and ambiguous enough to be commonly recognized but "used" in dif-ferent ways. Star and Greismer (1989:393) make a similar observation in defining what they refer to as "boundary objects" as "plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites." Thus, we can begin to see different cul-tural objects as *more or less* like Rorschach inkblots, and thereby operating *more or less* as actants in the creation of cultural meanings in combination with schematic associations and interactions.

HYPOTHESES

Having established our theoretical framework, our hypotheses look to how schemas, interactions, and objects both independently and jointly create shared meanings.

Independent Effects

We first look at the independent effect of shared schemas in meaning-making. From the literature we would predict that two individuals with shared schemas should be more likely to derive shared meanings from the same object, even if it is unfamiliar or deliberately ambiguous. This is our first hypothesis:

Hypothesis 1: Controlling for interactions and objects, shared schemas predict initial interpersonal consensus in meanings.

While shared schemas are important, we do not believe shared meanings are entirely contingent on overlapping schemas. Interaction matters. Our framework,

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[7] See Taylor and Stoltz 2020 for a workflow to unearth schemas from text, and Ignatow 2009 for a variant on the same idea.

therefore, leads us to suspect that two individuals with different schemas would be able to derive shared meanings through face-to-face interaction (albeit with some additional effort), so long as the interaction was one guided by the goodwill of a cooperative social situation. Thus, in Hypothesis 2 we look to the independent effects of interaction on cultural meaning-making:

> *Hypothesis 2:* Controlling for shared schemas and objects, group discussion leads to an increase in shared meaning from time 1 to time 2.

Finally, our framework allows for objects themselves to guide or nudge meanings in some interpretive directions and not others. In other words, even among individuals who have not interacted, and who differ in their schemas, we suspect that objects encoded with meanings will generate more clarity in how their meanings are to be received as compared to similar objects that do not contain institutionalized meanings. Importantly, we believe this effect should hold even when objects are stripped of the many contextualizing and supportive scaffoldings of meaning provided by critical commentary, object placement, advertising, and so on. In short, among individuals who partake in the broadly shared meaning systems around which objects are created, the encoding process constrains the range of possible meanings that individuals may derive:

> *Hypothesis 3:* Controlling for shared schemas and interactions, less ambiguous objects predict initial clarity in meanings.

Joint Effects

We elaborate on our first three hypotheses by looking at how schemas, interactions, and objects combine in meaning-making processes. The intersection of shared schemas with face-to-face interaction is the subject of our fourth hypothesis. Here, we see shared schemas as facilitating the production of greater shared meanings at more deliberative levels—i.e., individuals who tend to organize cultural elements in a similar way will have an easier time deriving shared meanings through face-to-face interactions. We therefore posit:

> *Hypothesis 4:* Controlling for objects, shared schemas at time 1 plus group discussion leads to greater increases in shared meanings at time 2 than either shared schemas or group discussion alone.

Finally, we examine meaning-making via a key postulate of symbolic interactionism—namely, the process of the *objectivation* of meaning and knowledge (Berger & Luckman 1967:49). In this view, interaction is the key to how new meanings are created as individuals make sense out of even essentially meaningless stimuli, coming to interpersonal agreements that focus on various shared frameworks of understanding. In this way, although the interaction is seen as the catalyst of meaning, interac-

tion works *in concert with* the meanings that are already stored within individuals, as well as the meanings that are stored within objects that have already been institutionalized as commonly agreed meanings (e.g., a set of shapes and colors are a flag for a particular country). Thus, while shared schemas and interactions should operate in tandem in facilitating meaning-making (as predicted in Hypothesis 4), our framework suggests that the role that objects play in the meanings made of them should also vary. We surmise that objects with highly institutionalized, "sedimented," or stabilized meanings should more readily activate schematic associations and change less in their meanings through interaction, whereas for more ambiguous objects or objects with less institutionalized meanings, individuals interacting with shared schemas should more rapidly and vociferously construct meanings all their own. Thus, we can posit:

> *Hypothesis 5:* The effects of shared schemas at time 1 and group discussion from time 1 to time 2 leads to a greater increase in shared meanings for more ambiguous cultural objects

DATA AND METHODS

The Sense of Smell and Meaning-Making

Building on recent research concerning the senses in culture and cognition (Cerulo 2018; Lembo 2020; Leschziner and Brett 2019; Winchester 2016), we focus on the process of shared meaning-making for scents. We do so for two reasons.

First, scents are a useful domain for analysis because it is notoriously difficult to isolate out the schematic associations derived through automatic cognition from other cognitive processes (Hunzaker and Valentino 2019; Miles 2014). We tend not to deliberately think before we respond to smells (Vlahos 2007), which is partially what causes them to be thought of as the "least intellectual" of the senses (Gonzalez-Crussi 1989). Instead, much like how schemas develop over repeated exposures, smells are closely linked to memory and emotion (Davies et al. 2003; Draaisma 2000; Vroon et al. 1997). Smells are also particularly ineffable and open to interpretation. While people are quite good at smelling, they are not good at describing smells in intersubjectively agreed-upon ways (Barwich 2020), and no set of objective referents (such as the color rainbow) can be used to parse smells and build comparisons across individuals and groups (Cain 1979). This means that, as cultural objects, scents may be particularly attuned to capturing the schematic associations of nondeclarative culture (Lizardo 2017; see also Cerulo 2018).

Second, while smells may quickly activate schematic associations, they are also central to meaning-making, and particularly meaning-making in the demarcation of group boundaries (Lamont and Fournier 1992; Largey and Watson 1972). Just as the sonic environment of the city can demarcate social boundaries (Schwarz 2015), some odors may mark "others" who are considered exotic or perhaps threatening. In turn, an entire field of bodily fragrances (perfumes, colognes, body sprays, etc.) has been socially constructed around a language of smells anchored in the combination

of various "notes" that are consciously encoded within cultural objects to communicate occasions, moods, or sociodemographic groups (Cerulo 2018; Moeran 2005). It is for all of these reasons that the social meanings of smells are atypically "turned to the world" (Alač 2017:143).

Meaning-Making Study Design

Selecting Four Fragrances: As guided by research that uses ambiguous images to study shared sense-making (e.g., Guilbeault et al. 2021; Mercier and Sperber 2017; Shepard and Cermak 1973), we varied scents with regard to their ambiguity. We did so by (1) removing the packaging on two clearly sociodemographically positioned fragrances and (2) by procuring five deliberately ambiguous fragrances from a renowned perfumier.

Our two store-bought fragrances—an expensive perfume and budget cologne— are marketed to distinct audiences. In an effort to evoke schematic associations through the presentation of incomplete information, we avoided fragrances for which the *particular* scent might be recognizable to our participants (e.g., Chanel No. 5 or Axe Body Spray). Two salespeople at a high-end department store assisted in selecting a less well-known perfume that "would be liked by a woman who likes Chanel No. 5." The cologne, which was purchased at a chain drugstore, has been marketed as a rugged masculine scent since its heyday in the 1980s, despite being closer in smell to a woman's *chypre* (a fragrance contrasting citrus and woody notes) from the 1930s.

We also procured five *deliberately ambiguous* fragrances from a nationally recognized *avant-garde* perfumier. While everyday cultural objects have encoded meanings and are not "simply" a "Rorschach equivalent" (Griswold 1987:1100), these five scents were, essentially, the olfactory equivalent of Rorscach inkblots.[8] Adapting the questionnaire from Cerulo (2018), we pretested these five fragrances with 45 individuals separated into three focus groups (one each of undergraduates, graduate students, and adult community members). We then selected the two fragrances with the least overall agreement (i.e., the largest standard deviations on our survey items). In fact, the two selected fragrances had almost *no* agreement. While they were generally recognized as fragrances, they were such unfamiliar fragrances that upon smelling the scent card one respondent asked, "is this *food*?"

Full Study Design: One hundred fifteen participants were recruited for a "meaning insight test" (see also Correll and Ridgeway 2006) from a large undergraduate sociology course at a highly selective private university in the American South. Participants were from various majors and constitute a heterogeneous cross-section of the university population. Like virtually all studies of the interactional or cognitive foundations of meaning-making (e.g., Brown-Saracino 2018; Cerulo 2018; Fine 1979; Rawlings and Childress 2019), our participants are not representative of any

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[8] A true blank page for smell may be a "white" scent (akin to "white noise" for sound), although white scents are too chemically unstable to use in an experimental setting (Weiss et al. 2012). The advantage of our deliberately ambiguous fragrances are they are at least somewhat recognizable as something that someone might wear, whereas they are like the scent equivalent of a Rorschach inkblot regarding *who* would wear them.

population. Rather, our sample is valid for our research goals: it allows for conversations to emerge among individuals with more or less shared frameworks of interpretation, discussing cultural objects with more or less ambiguity.

As recommended by the perfumier, fragrances were applied just prior to the study onto numbered Post-it notes. Participants were given a link to a forced-choice item survey, which they completed on their laptops. The order of their initial interpretations of fragrances was randomized, as were survey items for each fragrance. Participants were instructed to smell each fragrance and then answer questions about it. They could request a second spraying. Ground coffee was provided as a (well-known) way to cleanse one's olfactory palate between fragrances.

As shown in Table I, for each fragrance our survey gauged two types of interpretative elements, all on a zero (not at all) to 100 (definitely) point scale: (1) common organic metaphors for direct (i.e., first-order) fragrance interpretations, and (2) sociodemographic groups for second-order interpretations of intended audiences.[9] We also included four cross-modal inferences about associated colors, shapes, and names. Our cross-modal inferences were derived in an attempt to "draw out" individual cultural associations (McDonnell 2014). To do so, we build on research concerning how, due to implicit mappings of the brain, individuals prefer some sensory combinations over others (Moeran 2011; Simner et al. 2010)—for example, larger objects "go together" with lower-pitched sounds and smaller objects with higher-pitched sounds (Evans & Treisman, 2009). Similarly, in many European cultures, the word "Walouma" (soft consonant and vowel sounds) is associated with round shapes, while "Takete" (hard consonant and vowel sounds) is associated with jagged shapes (Köhler (1970[1929]); Heise 1966). Regarding scents, lemon and pepper notes are more often associated with angular shapes, whereas vanilla and raspberry are more often associated with round shapes (Hanson-Vaux et al. 2013). We strongly expect that these types of cross-modal associations lend their support to both first- and second-order inferences—for example, "Walouma" and blue circle helping anchor lighter and feminine meanings (as would be provided by product packaging).

Table I.   Categories Used in Meaning Insight Task for Fragrances

First-order inferences	Second-order inferences	Cross-modal inferences
Citrus	Male	"Walouma"
Greens	Female	"Takete"
Floral	Younger	Red triangle
Woodsy	Older	Blue circle
Spicy	Black	
Light	White	
Heavy	Latinx	
Simple	Asian	
Complex	Upper class	
Natural	Middle class	
Synthetic	Working class	

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[9] Clearly, these categories do not exhaust the list of possible associations; however, these are common terms used in the perfume industry, and largely replicate those used in focus groups by Cerulo (2018).

In sum, an individual's pattern of associations among all of these interpretive elements is a reasonable proxy for an individual's schema, and the extent to which two or more individuals share the same underlying associations gauges a cultural schema.

After participants entered the initial survey items for all four fragrances they were instructed to find two partners with whom to discuss two of the fragrances. As is the case in most social interaction (and unlike, say, a jury deliberation), participants were told that they were just supposed to talk through their interpretations and were under no obligation to reach consensus. As such the scope conditions for our analysis are generally in line with the symbolic interactionist approach: "for a cooperative act to unfold, interactants must (i) establish copresence, (ii) demonstrate reciprocal attention, (iii) reveal mutual responsiveness, (iv) create congruent functional identities, (v) build a shared focus, and (vi) devise a social objective" (Fine 1993:72; see also Couch 1984). In our case, the reciprocal attention was dedicated to an object of common interest (Fine 1979; Knorr-Cetina 2002; Lee 2009).

The first small-group discussions focused on the high-end women's perfume and one of the two deliberately ambiguous fragrances. After this discussion, participants filled out the same survey for the first two fragrances. They were instructed to then find an entirely new group and to complete the task again for the cologne and second deliberately ambiguous fragrance.[10]

Variables Used in Models

Consensus—What People Smell: Our dependent variable concerns the *social meanings of fragrances*—i.e., participants' understandings of each fragrance's targeted sociodemographic groups (see Table I). For each fragrance k, we measure each ij dyad's consensus in social meanings by correlating each ijk response vectors for the 11 sociodemographic characteristics. The conceptual range of the variable is −1.0 (total disagreement) to 1.0 (total agreement), where a score of zero indicates neither agreement nor disagreement. For example, two individuals who thought the expensive perfume was aimed at white, upper-class, middle-aged women would score higher than if one thought the fragrance was also aimed at younger people and Asians. In short, individuals with similar patterns of who they thought a particular fragrance was (and was not) intended for, would have greater interpretive consensus. We measure each dyad's consensus both prior to and after interactions.

Shared Schemas—How People Smell: While consensus concerns agreements in *what* individuals smell in any particular fragrance, cultural schemas concern *how* individuals smell across multiple fragrances. For example, two individuals may disagree about whether or not a particular fragrance is supposed to appeal to men or women

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[10] Differences between first and second group formations do not drive our results, suggesting that having a common task and some degree of goodwill guiding the interaction was not entirely conditioned on self-selecting into groups based on friendship.

while nonetheless sharing the common olfactory schema in which "woodsy" goes with "male" and "floral" goes with "female."[11]

Researchers have tended to derive cultural schemas through patterns of between-individual variation in survey responses (e.g., Boutyline 2017; Boutyline and Vaisey 2017; Goldberg 2011). Conceptually, such an approach sees schemas as social facts that are above any individual. Such aggregate approaches to schemas take for granted what we seek to elaborate and test in this study—namely, that cultural schemas shape meaning-making and individuals who share schemas will help one another make sense of the world through interaction and cues in objects. Our approach, therefore, gauges each individual's schema separately by using within-person variation in *how* each individual makes sense of smells across a range of fragrances.

For each individual i with $n = 26$ attitudinal measures across $k = 4$ fragrances at time $t = 1$, we derive an $n \times n$ correlation matrix. Because each individual reports their interpretations of four independent fragrances, it is possible to gauge how each individual puts together elements—for example, "woodsy" goes with "male" and "floral" goes with "female." Across our 26 elements, each individual's schema can be summarized by how these elements are positively/negatively correlated with one another across the four fragrances. In short, this produces a network of associations for each individual i where first-order, second-order, and cross-modal attitudes are more strongly linked in an individual's attempts to make sense of the fragrances.

But to what extent are these schemas *cultural* (i.e., shared across individuals)? After deriving pairwise correlation matrices for each individual, we derive a *dyadic shared schema* measure. Essentially, we correlate each individual's correlation matrix with every other individual's correlation matrix. For each individual i, the correlation matrix $\mathbf{R_i}$ contains 325 dyadic correlations ($\frac{1}{2}[26 \times 26]$-26). For the 115 individuals in our sample, we create a row vector of 325 dyadic correlations. We then create a 115×115 ij similarity matrix based on the correlations of these correlations. The pairwise similarity matrix $\mathbf{S_{ij}}$ captures how close individuals are with respect to how they smell across fragrances.[12] Two individuals who tend to smell fragrances in similar ways will have higher similarity scores. Again, this measure is independent of whether or not these individuals agree about the social meanings of a particular fragrance, and focuses solely on the links two individuals tend to make across a range of fragrances.

Finally, we can examine the extent to which schemas fall into different classes of cognitive subcultures by clustering the dyadic shared schemas using a modularity

[11] This distinction between different ways that individuals may or may not share cultural elements was usefully outlined by Martin (2002) as the difference between groups with consensus (e.g., agreements in what we smell) and tightness (e.g., agreements in how we smell). See also Hutchins (1995:245), who makes the same distinction in explaining distributed cognition when writing that "sharing the schema is sharing, the pattern of connections among the units. Sharing the interpretation is having the same pattern of activation across the units."

[12] It is worth noting that shared schemas are not the same as consensus in how individuals and there is no mechanical relation between the two: shared schemas are derived across all four fragrances in how all 26 interpretive elements are paired in similar ways, while consensus focuses on a single fragrance and the correlation of the response vectors for the 11 second-order interpretations. As a robustness check, we ran models that eliminated the 11 second-order variables from each focal fragrance when determining shared schemas, and our results remained substantively unchanged.

maximization routine via k-means clustering. This technique seeks the best-fitting partitioning of the similarity matrix. Once such schema clusters have been identified, we can visualize schemas by mapping the centroids for each dyadic correlation ($\bar{S}_{ij}$) for all individuals in a given schema.

Controls: To isolate the effects of shared schemas net of the social-structural factors that may (or may not) shape them, we include sociodemographic controls: *both male, both female, both White, both Black, both Latinx, and both Asian.* We also include two measures of class-based differences: (1) both respondents attended *private high school* and (2) *ij distance in cultural capital,* which was constructed from five questions on childhood arts exposure (self-reported childhood attendance for museums, concerts, and plays, receiving music lessons, and going on international cultural tourism).

Hypothesis Tests

We evaluate our hypotheses at the dyad level—i.e., our units of observation are all 6,555 *ij* pairs of individuals in the study ($\frac{1}{2}$[115 × 115]-115) observed separately for each of the four fragrances. To test Hypothesis 1, we use dyadic logistic regression models with multiway-clustered standard errors at the ego *i* and alter *j*, which accounts for the nonindependence of observations (Cameron et al. 2008).[13] The model predicts the initial consensus ($C_{ij(t1)}$) among all *ij* pairs and can be written as.

$$C_{ijk(t1)} = \propto_{ijk(0)(t1)} + \beta_1 S_{ij} + \mathbf{Z}_{ij}\beta_2 + \mathbf{F}_k\beta_2 + e_{ij}, \tag{1}$$

where $\propto_{ijk(0)(t1)}$ is a baseline *ij* consensus for the expensive women's perfume (i.e., the omitted category of *k*) and where all other predictors are zero; S_{ij} is the *schema similarity* measure $\mathbf{Z}_{ij}$ contains dyadic sociodemographic controls; and $\mathbf{F}_k$ contains dummy variables for three additional fragrances. The coefficient β_1 tests Hypothesis 1's prediction that even without any interaction or encoded objects, shared schemas set a baseline for shared meanings—in this case, the social meanings of each fragrance captured in the initial correlations of second-order inferences.

Hypothesis 3 is also concerned with consensus prior to interaction but looks to potential differences between encoded and nonencoded objects. Across the ambiguous and encoded object for the eleven second-order inference questions, we use t-tests to evaluate both (1) differences in standard deviations (2) differences in the mean absolute values for the departures from midpoint (50). Hypothesis 3 would be supported if ambiguous fragrances on average have larger standard deviations and smaller average departures from the midpoint.

Hypotheses 2, 4, and 5 require longitudinal models. We, therefore, estimate a set of dyadic models predicting the overall change in consensus ($C_{ij(t2)} - C_{ij(t1)}$). To test Hypotheses 2 and 4, we estimate models of the following form:

$$C_{ijk(t2)} - C_{ijk(t1)} =_{ijk(0)} + \beta_1 C_{ijk(t1)} + \beta_2 S_{ij} + \mathbf{Z}_{ij}\boldsymbol{\beta}_3 + \mathbf{F}_k\boldsymbol{\beta}_4 + e_{ij}, \tag{2}$$

[13] Models were substantively unchanged with the addition of a group-level (i.e., triad) level of clustering of standard errors.

where $\delta_{ijk(0)}$ is a baseline change in ij consensus for the expensive women's perfume, all other predictors are zero, and all other notation is consistent with Equation (1). We control for the initial ij consensus ($C_{ijk(t1)}$) to account for known ceiling effects. We estimate two separate models: one for dyads in which individuals discussed fragrance k and one for dyads that did not engage in a discussion for that fragrance. We test Hypothesis 2 (net of shared schemas and encoded objects, group discussions will lead to greater consensus) by comparing dyads in which individuals did and did not discuss the fragrances—i.e., the average of the four fragrance intercept terms ($\delta_{ijk(0)} + F_k\beta_4$) where schema similarity is zero. We test Hypothesis 4 (shared schemas plus group discussion produces greater gains in consensus than either schemas or discussion alone), by comparing β_2 among discussion and nondiscussion dyads—that is, we use the pairs of individuals who did not discuss a given fragrance as a type of counterfactual for those pairs that did discuss the fragrance.

We test Hypothesis 5, which also concerns the overall change in consensus, with the following model:

$$C_{ijk(t2)} - C_{ijk(t1)} = _{ijk(0)} + \beta_1 C_{ijk(t1)} + \beta_2 S_{ij} + \beta_3 A_k + \beta_4(S_{ij} \times A_k) + \mathbf{Z_{ij}}\boldsymbol{\beta}_5 + e_{ij}, \qquad (3)$$
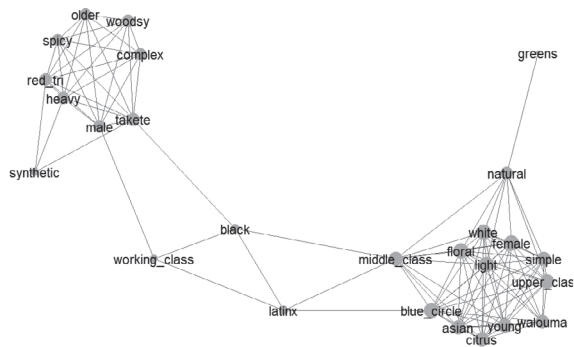
where all notation is consistent with Equation (2) with some minor differences. Rather than including dummy variable for each fragrance, we include a single indicator variable (A_k) for when the fragrance is one of the two ambiguous scents. We interact this with the schema similarity variable. Once again, we estimate separate models for discussion and nondiscussion dyads. According to Hypothesis 5 shared schemas should be especially helpful in deriving shared meanings when the object is ambiguous, but only when individuals interact and thus these schemas are activated. Thus, if Hypothesis 5 is correct β_4 should be positive and significant.
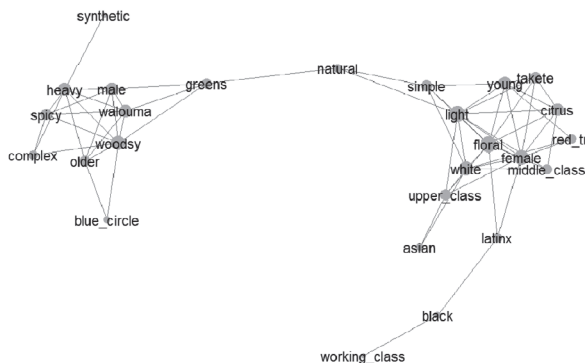
RESULTS

Inducing Olfactory Schemas—How People Smell Fragrances

How shared were our participants' schemas across our four fragrances? Based on the gap statistic from the modularity maximization algorithm, the optimal cutoff for clusters is three; however, the statistic continues to improve with additional clusters (see Fig. A1 in the Appendix). This lack of a clear cutoff leads us to consider these three schemas as "slices" along a continuum, rather than as clearly delineated cognitive subcultures. Figure 1 shows the three derived schemas. To facilitate interpretation, we show only the positive ties above 0.20 and use the Fruchterman–Reingold layout algorithm to position the nodes.
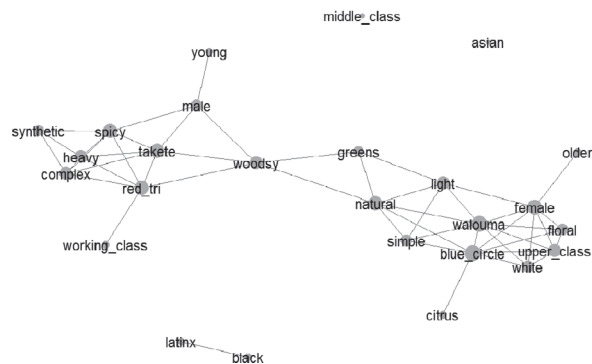
Our reading of these schemas is that they reflect underlying differences in one's facility and familiarity within this cultural domain. While several commonalities are present across schemas—notably, all three show a clear division of male versus female—they vary considerably in their density and structure. Schema 1 is the most clearly structured: it has the most densely interconnected and bifurcated set of associations with two very clearly defined clusters where oppositions among first-order (e.g., simple/light/natural vs. complex/heavy/synthetic), second-order (male vs. female), and cross-modal associations are all tightly interconnected. Schema 1 also

Schema 1 (n=36)

Schema 2 (n=33)

Schema 3 (n=46)

Fig. 1.   Three Olfactory Schemas. Note: Only positive ties >.2 are shown; nodes are sized according to centrality. The number of respondents in each cluster is shown in parentheses.

shows a clear ordering of race/class/gender associations, moving from upper-class/ white/female through middle class/Asian/female to more working class/male/ Latinx/Black, anchored in different second-order and cross-modal associations. An

individual holding such a schema would ostensibly have little difficulty in quickly placing a particular fragrance within this deeply connected web of implications.

In contrast, the other two schemas are less densely connected and have isolates or "pendants" (nodes with a single connection). Schema 2 is a somewhat looser rendition of Schema 1, which also reverses the cross-modal gender associations of shapes, colors, and sounds. Schema 3 is clearly the least organized, having less well-defined oppositional clusters and a number of disconnected elements. Thus, individuals holding Schemas 2 or 3 do not have strong associations with a number of the interpretive elements that help to provide a basis for making sense of fragrances. For example, in Schema 3, no associations exist for many second-order inferences (Asian, Latinx, Black, and middle class), and several others (young, older, and working class) only have a single strong association. Cross-modal inferences also hold a much more central position in Schema 3. Consequently, an individual with such a schema would presumably be able to describe a fragrance in terms of first-order associations and cross-modal inferences, but (beyond gender associations) have a very difficult time placing who the intended audience might be. It is worth noting, that this is a plurality of respondents ($n = 46$).

In subsequent multinomial logistic regressions (not reported here), we predicted schema membership and found very few sociodemographic differences. However, gender and cultural capital were significant predictors: higher cultural capital and being female predict Schema 1 membership, lower cultural capital predicts Schema 3, and being male predicts Schema 2. This finding is consistent with our reading that Schema 1 represents a greater exposure and facility with the domain of fragrances. Given the homogeneity of our participants with respect to age and their relatively high average SES, we believe we would likely find even greater schema heterogeneity in the general population.

But how do individuals put these schemas to work in making meaning? One can imagine the relative interpretive ease or difficulty that individuals might have in making sense of more or less ambiguous fragrances given their schemas and with whom they interact. Our hypotheses are meant to provide a systematic and formal approach to such intuitions.
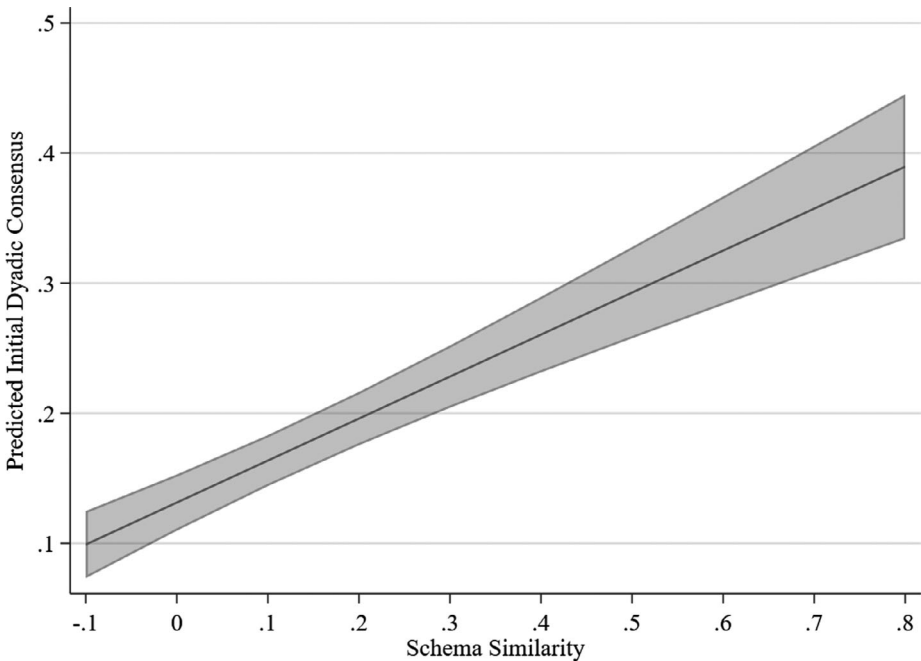
Shared Schemas and Initial Interpretations

Table II and Fig. 2 show results from dyadic regression models predicting initial consensus for the four fragrances. In support of Hypothesis 1, we find that in three of four fragrances individuals sharing similar schemas also tend to have greater levels of initial consensus with respect to the social meanings of specific fragrances. The magnitude of this effect is nontrivial: controlling for objects and having not yet interacted, two individuals with no schema similarity would have only a modest shared understanding of the intended audiences of the fragrances ($\alpha = 0.12$), while two individuals who have schemas correlated at 0.8 would have more than three times the initial consensus ($\alpha = 0.39$). In short, *how* individuals smell lead to a greater agreement in *what* people smell, apart from any direct interpersonal influence and net of variation in fragrance ambiguity.

Table II.   Hypothesis 1: Dyadic Models Predicting Initial Consensus in Fragrance Interpretation

Variable	β	SE
Schema similarity	0.32***	(0.04)
Sociodemographic controls		
Both male	−0.05***	(0.01)
Both female	0.06***	(0.01)
Both White	−0.03*	(0.01)
Both Black	−0.01	(0.02)
Both Latinx	−0.00	(0.02)
Both Asian	0.05*	(0.02)
Cultural capital distance	−0.02*	(0.01)
Both private high school	0.01	(0.02)
Fragrance indicators (baseline=perfume)		
Ambiguous 1	−0.19***	(0.03)
Ambiguous 2	−0.17***	(0.04)
Cologne	−0.22***	(0.03)
Constant	0.27***	(0.03)
Number of observations	49,958	

*$p < .05$, **$p < .01$, ***$p < .001$.

Fig. 2.   Predicted Initial Shared Meanings Based on Dyadic Schema Similarity.

These results also offer some initial support for Hypothesis 3's assertion that meanings are to some extent encoded within the fragrances themselves. The expensive women's perfume was much more likely to be decoded in similar ways even

when individuals did not share schemas and had not yet interacted. However, this higher level of initial agreement does not extend to the budget cologne. We test Hypothesis 3 more directly and in greater detail below.

Meaning-Making in Interaction

Results from dyadic regression models predicting changes in consensus are shown in Table III and Fig. 3. Separate models are estimated for discussion dyads and the nondiscussion dyads, which provide a type of counterfactual (i.e., how much agreement would be achieved for a given fragrance if two individuals did not interact with one another but had nonetheless discussed the fragrance elsewhere?). Results offer support for Hypothesis 2. The baseline change in consensus is stronger for dyads who discussed fragrances. On average, individuals who interacted achieved an increase in consensus that was 0.14 higher than those who did not interact for the same fragrance (.33 vs. 0.25 for the expensive perfume; 0.21 vs.0.07 for the budget cologne; 0.24 vs. 0.11 for the first ambiguous fragrance; 0.33 vs. 0.14 for the second ambiguous fragrance). In brief, in deriving shared meanings, interaction boosts consensus net of individuals' initial interpretations and shared schemas.

Figure 3 shows predicted consensus before and after discussions, using Table III coefficients. To facilitate interpretation, we use predicted probabilities based on significant coefficients in these models. In support of Hypothesis 2's prediction that (net of shared schemas and encoded objects) interaction produces shared meanings, we can see the significant difference in predicted increases in consensus when schema similarity is zero (note all other coefficients are held at their mean values). We will return to this figure below when discussing Hypothesis 4. For now, in clear support

Table III. Hypotheses 2 & 4: Dyadic Models Predicting Increases in Consensus

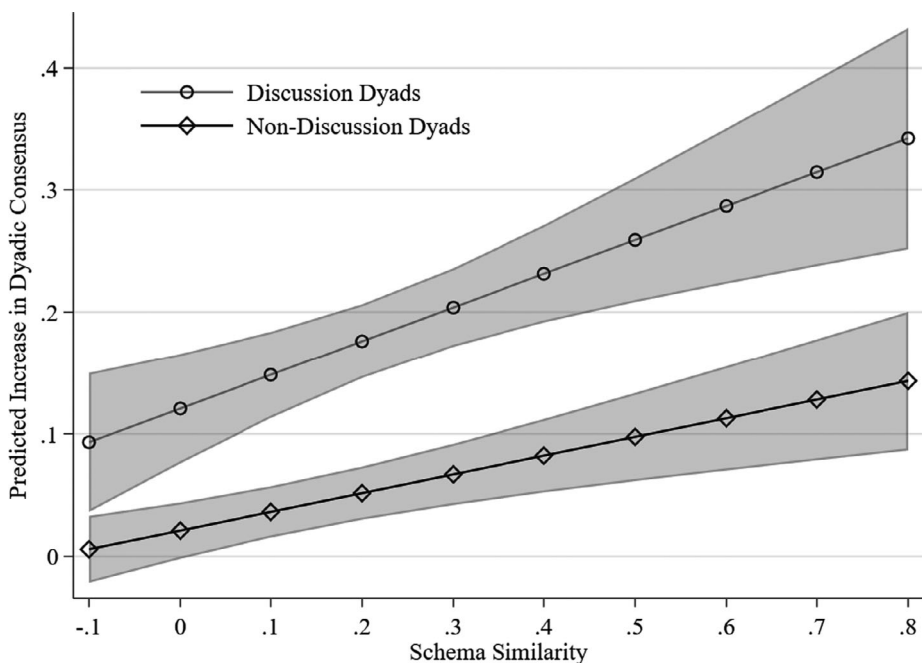| Variable	Discussion Dyads		Non-discussion dyads	
	β	SE	B	SE
Time 1 consensus	−0.81***	(0.03)	−0.77***	(0.02)
Schema similarity	0.28***	(0.08)	0.15***	(0.04)
Sociodemographic controls				
Both male	0.04	(0.04)	−0.02*	(0.01)
Both female	0.01	(0.04)	0.05**	(0.02)
Both White	0.05*	(0.03)	0.03*	(0.01)
Both Black	−0.11*	(0.04)	−0.12***	(0.01)
Both Latinx	−0.17***	(0.05)	0	(0.03)
Both Asian	0.01	(0.05)	0.02	(0.02)
Cultural capital distance	−0.01	(0.02)	−0.00	(0.01)
Both private high school	0.07*	(0.03)	0.03*	(0.02)
Fragrance indicators (baseline=perfume)				
Ambiguous 1	−0.09*	(0.04)	−0.14***	(0.03)
Ambiguous 2	−0.07	(0.04)	−0.11**	(0.04)
Cologne	−0.12**	(0.04)	−0.18***	(0.03)
Constant	0.33***	(0.04)	0.25***	(0.03)
Number of observations	1,244		48,272	

*p < .05, **p < .01, ***p < .001.

Fig. 3. Predicted Increases in Shared Meanings Based on Dyadic Schema Similarity.

of Hypothesis 2, we find that across the range of schema similarity the overall increase in shared meanings is between 0.10 and 0.20 higher when individuals discussed the given fragrance than when not discussing that fragrance.

Object Encoding and the Clarity of Initial Meaning-Making

Our models have already offered some initial support for Hypothesis 3's prediction that the meanings encoded in objects lead to greater shared meanings in initial interpretations. Prior to any discussion and devoid of any supportive materials, individuals' interpretations are more similar in the case of the most schema-consistent of our chosen fragrances (the expensive perfume). Here, we extend the test of the hypothesis to look at differences between the encoded and ambiguous fragrances.

Table IV shows the means for the second-order interpretations for the encoded versus ambiguous fragrances, as well as the results of t-tests for standard deviations and absolute departures from the midpoint for these variables. In general, participants tended to interpret both of the encoded fragrances as expensive, young women's perfumes (see Appendix for complete results on initial interpretations for each fragrance). In support of Hypothesis 3, standard deviations for the ambiguous fragrances are on average significantly higher than for the encoded fragrances, indicating less overall agreement and clarity with respect to the intended wearer of these fragrances. The exception concerns age. Ambiguous fragrances were interpreted by this young audience as likely intended for older people. In terms of the absolute

Table IV. Hypothesis 3: T-Tests for Mean Differences Between Encoded and Ambiguous Fragrances in Clarity of Initial Interpretations

	Encoded			Ambiguous		
	μ	μ of SD	μ Deviation From 50	μ	μ of SD	μ Deviation From 50
Male	32.70	30.73	30.79	56.51	31.31*	27.55*
Female	74.00	28.75	34.02	44.76	32.54*	28.27*
Younger	52.20	24.73	20.57	34.52	23.21†	23.60†
Older	57.38	24.44	21.49	67.57	22.81†	25.29†
Black	52.14	18.22	13.69	49.31	19.90*	14.66
White	66.30	17.74	19.52	56.80	21.62*	17.28*
Latinx	53.27	17.74	13.56	48.21	19.56*	14.23
Asian	54.27	17.53	13.41	44.16	20.71*	15.53
Upper class	62.56	20.13	19.52	47.00	23.33*	19.14
Middle class	62.63	14.45	15.19	55.87	18.03*	14.57
Working class	46.57	18.97	15.03	49.27	22.12*	17.42†

*Significant in predicted direction ($p < .05$).
†Significant in opposite of predicted direction ($p < .05$).

departures from the midpoint, the results are more mixed. The encoded fragrances elicited much clearer responses with respect to gender and whiteness; however, the ambiguous fragrances once again had a clearer response with respect to age, as well as being more working class.

On the whole, these results support the assertion that objects are not entirely blank slates onto which any meaning can be projected. The encoded fragrances nudged participants in a clearer direction, while the ambiguous fragrances were open to an initially wider range of interpretations. However, the overall ambiguity seems to have been routinely filled with interpretations of "otherness"—in this case, centered on age and class.

How Interaction Combines with Schemas and Objects

The results from our first three hypotheses make clear that schemas, interactions, and objects each play an independent role in shaping meanings. We now examine how these sources of meaning-making may operate in concert. Returning to the results presented in Table III and Fig. 3, we evaluate Hypothesis 4's prediction that shared schemas combine with interaction to produce greater shared meanings. Here, we can see that the effect of shared schemas is noticeably stronger among discussion dyads ($\beta = 0.28$) than among nondiscussion dyads ($\beta = 0.15$) – i.e., along the range of shared schemas group discussion matters, but group discussion matters more as schemas overlap more. Indeed, we note that, according to these results, having a largely shared schema outweighs interaction in generating increased consensus. At around 0.7 schema similarity, our model predicts a 0.12 increase in interpretive consensus, which is more than the increase predicted when *ij* are in the same group but

with 0 schema similarity. And yet, as Hypothesis 4 predicted, it is really the combination of a shared schema and interaction that ratchets up shared meanings.

Our final hypothesis, Hypothesis 5, predicted that the effects of interaction and shared schemas on shared meanings would be especially pronounced when cultural objects are more ambiguous. Results in Table V support the hypothesis. The effect of shared schemas combines with the ambiguity of the fragrance only when individuals interact and discuss the fragrance. More similar schemas plus interaction leads to more shared meanings for the deliberately ambiguous fragrances than for the encoded fragrances. In the model restricted to nondiscussion dyads, the interaction is not significant.

Figure 4 shows predicted increases in shared meanings based on coefficients in Model 1 of Table III. When i and j do not share an olfactory schema (and all other variables are set to their mean values), encoded objects are somewhat more likely to facilitate consensus as compared to ambiguous objects. However, as schema similarity increases, individuals are more capable of making similar meanings in both encoded and ambiguous objects. In support of Hypothesis 4, the effect is clearly stronger when the fragrance is ambiguous—i.e., individuals are especially able to derive shared meanings when presented with objects that are more akin to the proverbial Rorschach inkblots. Notably, the meanings made of the ambiguous objects were also more heterogenous *across* groups. Put another way, not only did groups more rapidly generate shared meanings for ambiguous fragrances but they also generated more divergent localized meanings for those fragrances as they started to institutionalize their own idiocultural meanings for them.

Table V. Hypothesis 5: Dyadic Models Predicting Increases in Consensus

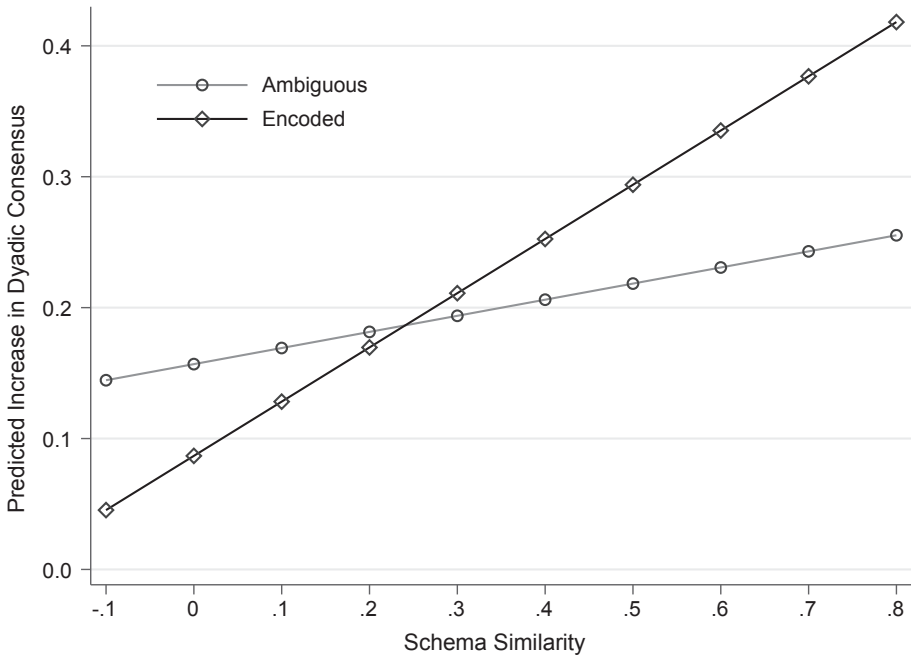| Variable	(1) Discussion Dyads β	SE	(2) Non-discussion dyads β	SE
Time 1 consensus	−0.80***	(0.03)	−0.74***	(0.02)
Schema similarity	0.12	(0.09)	0.12*	(0.06)
Fragrance ambiguous	−0.07	(0.04)	−0.04	(0.03)
× Schema similarity	0.29*	(0.13)	0.06	(0.08)
Sociodemographic controls				
Both male	0.04	(0.04)	−0.02*	(0.01)
Both female	0.01	(0.04)	0.04**	(0.02)
Both White	0.05*	(0.03)	0.03*	(0.01)
Both Black	−0.11*	(0.04)	−0.12***	(0.01)
Both Latinx	−0.17***	(0.05)	0.00	(0.03)
Both Asian	0.01	(0.05)	0.02	(0.02)
Cultural capital distance	−0.01	(0.02)	−0.00	(0.01)
Both private high school	0.07*	(0.03)	0.03	(0.02)
Constant	0.29***	(0.03)	0.16***	(0.02)
Number of observations	1,244		48,272	

*$p < .05$, **$p < .01$, ***$p < .001$.

Fig. 4. Predicted Increases in Shared Meanings Based on Schema Similarity Within Discussion Dyads.

DISCUSSION

In this paper, we look to the constituent roles of schemas, interactions, and objects in meaning-making. We find that even absent interaction, shared schemas set a baseline for shared meanings, and objects afford a wider range of interpretations when they are unladen with already institutionalized encoded meanings. Yet interactions also generate shared meanings, and shared schemas in interactions ratchet up shared meanings even more. When presented with deliberately ambiguous objects that do not have institutionalized encoded meanings, individuals with shared schemas work rapidly in coming to shared meanings. For those who do not share schemas, it is the objects with an institutionalized encoded meaning that allows for more agreement as compared to more ambiguous objects.

These results begin to untangle the paradox in which culture can be largely unshared, and yet shared meanings happen with great facility. To use the metaphor of culture as a shared image, our findings suggest that it is through schematic associations that individuals hold the outlines for culture, while interactions and objects help to fill in the colors. To the extent that individuals share similar outlines for culture, the colors provided through interaction will rapidly create a vividly shared understanding, even when objects themselves do not present individuals with much to facilitate the process. When individuals do not share outlines, the colors provided by interactions and objects will create a more impressionistic, but still commonly shared, understanding.

We see this work as leading to a range of future questions and research directions. First, we devise what is for cultural sociology a novel but reproducible quasi-experimental design. We see a wealth of variations and elaborations to our approach. First, while we operate under scope conditions that are very familiar to studies of meaning-making—i.e., face-to-face groups engaging in a common task with some degree of interpersonal goodwill rather than competition or identity-laden interaction—this can be varied. In the experimental spirit of "roughing up the interaction order" (Tavory and Fine 2020:17), one could introduce minimal groups such that a "walouma" ends up in a group with all "taketes," or groups based on fake competencies in meaning-making are established. Interactions could also be varied, be it for the size of groups (e.g., smaller or larger), the types of social ties (strong, weak, or null), the duration of interactions, or more purposefully with regard to the heterogeneity of the groups, be it along the lines of sociodemographic variety or schematic differences. For example, more real-world social cleavages could also be tested, such that both real political differences (or deceptively introduced ones) are used in the establishment of groups. These types of manipulated conditions may not facilitate shared meaning-making and may instead generate interpretive fragmentation or even polarization.

Researchers might also consider varying the domain of objects, and focus on paintings, songs, cuisines, or poems of varying ambiguity instead. One might then explore how durable and transposable schemas are across such realms. Using a similar design that incorporates multiple objects within a domain and multiple types of inference for those objects, we also believe future work can take up the question of the degree to which schemas are better conceptualized as discrete or continuous across populations, and the degree to which different schemas in any given domain are embedded within some sociodemographic groups and not others. Experience within a cultural domain may also be a worthy subject of longitudinal analysis, such that novitiates (e.g., MFA students, apprentice sound recording engineers, or sommeliers in training) could be followed in an analysis of the coevolution of schemas and meaning-making in specific domains.

We believe our approach to deriving schemas also provides a novel methodological contribution. Our individual-level approach to gauging schemas is closer to the framework devised in cognitive anthropology (D'Andrade 1995; Strauss and Quinn 1997) and offers a viable addition to the more frequent sociological approach of trying to derive schemas from aggregate surveys (Boutyline 2017; Goldberg 2011), while being less laborious than related approaches based on repeated question designs (Hunzaker and Valentino 2019). Using intraindividual variation provides a novel formalization, which could be applied to any number of attitudes, beliefs, and tastes, or used to validate more macrolevel approaches. Our approach also affords opportunities to further examine how schemas may—net of any direct interpersonal influences—lead to shared meanings over time. While it is perhaps provocative to find that at some levels shared schemas generate even more shared meanings than does interaction, this finding is consistent with current efforts that move beyond a "contagion-like" model of cultural diffusion (Goldberg and Stein 2018; Hunzaker 2016). Future work could probe the cognitive mechanisms at play in how individuals

similarly decode objects and come to shared meanings even when they do not directly interact with one another.

Likewise, we see our findings as yet another vote for the trend to take objects more seriously in cultural analyses (Cerulo 2018; Childress 2017; Rubio 2014; McDonnell 2016). Inspired by Griswold (1987), here we look to varying levels of ambiguity in cultural objects and their differential effects on meaning-making. For a long time, sociologists have perhaps swung too far in acknowledging the multivocality of cultural objects, such that they treated objects as reasonably meaning *anything* to any person. In reality, just as cultural objects vary in their materiality and affordances, they vary in their aesthetic characteristics, and in their abstraction, ambiguity, and ultimately, likely their multivocality too. Consciously incorporating multiple objects that vary along any range of measurable dimensions into analyses of meaning-making is, we believe, a fruitful path forward. We believe that this is key in constructing analyses that, as Griswold (1987:111) advocated for over thirty years ago, are "neither deterministic nor naïve about cultural materials."

A notable limitation in our work is that while we measure meanings before and after interaction, we did not record interactions, and the mechanisms by which interactions shift meanings are therefore excluded from our analyses. This need not be the case, and if possible, should not be the case moving forward. Although it is not the focus of our analysis, we also note that we found some (albeit relatively small) variation in schemas by sociodemographic groups. The relative homogeneity of age among our respondents may be masking age-related variation. We also did not ask participants for their knowledge of the field space (e.g., knowledge of perfumes) which may explain some of the variations in schemas as well. A third reasonable critique may be that in focusing on schemas, interactions, and objects we have discounted other locales in which culture can be measured, or that schematic associations do not exhaust all of the cultures that is in individuals. For instance, in this work, we have largely avoided discussion of culture as it exists in institutions, fields, organizations, nations, and so on. While we believe culture can certainly be measured in each of these arenas, it does not mean that culture *lives* in them independently of individuals, interactions, or objects. Put another way, as a thought experiment, consider if we could instantaneously erase all the culture in individuals, interactions, and objects: would there be any institutional or organizational culture left to erase? We hope future work can incorporate these other levels of cultural analyses into a similar approach of how meanings are made.

One useful extension along these lines could be to document the process by which meanings become institutionally embedded into objects. For instance, perhaps after creating meaning out of an ambiguous scent, a group then creates a marketing campaign for that scent. Then the scent and the marketing campaign are given to a new group, and the researcher tests to see if the marketing campaign works in binding the previously derived meaning to the scent. Then the next week both the first group (who only had the scent) and the second group (who had the marketing campaign and the scent) are given the scent again, and the researcher can test if the marketing campaign plus the scent has been imprinted on the meaning for the scent for the second group more than the scent itself imprints a meaning for the first group. If done across multiple scents one could essentially be measuring the for-

mation of institutionalized associations across a domain of previously ambiguous and unorganized objects (e.g., Mohr and Duquenne 1997). Ultimately, are schemas mostly just historicized interactions that have been partially stored in objects, and if they are not is culture therefore "an amorphous, indescribable mist which swirls around society members" (Fine 1993:733)? We believe this is both a measurable and an answerable question.

More generally we agree with DiMaggio's (1997:274) assessment that understanding the interplay between schemas and the objects that activate them is a "central challenge for sociologists of culture." Adding in the constituent effects of interaction and doing so across a variety of settings and methodological approaches is, we believe, not only a central challenge for sociologists of culture but also an achievable one.

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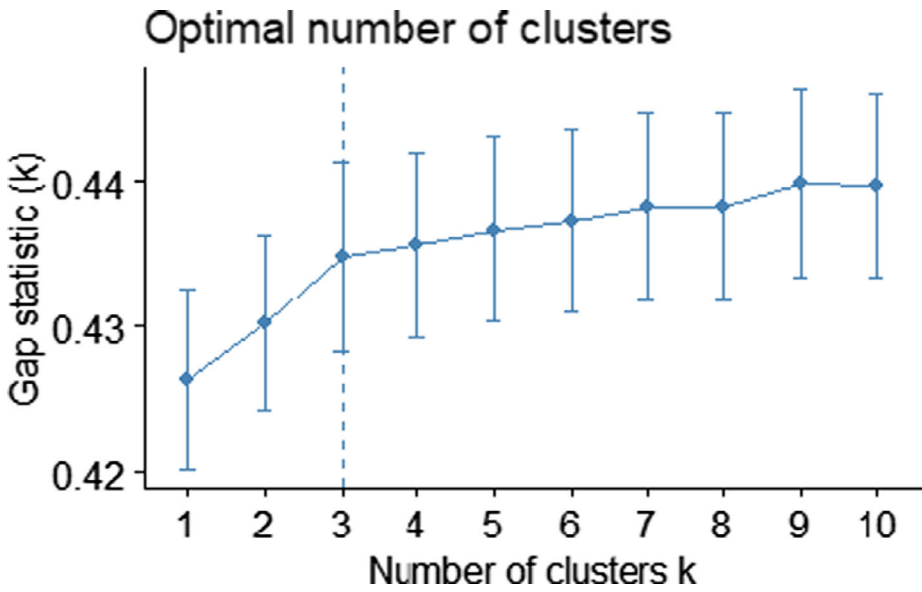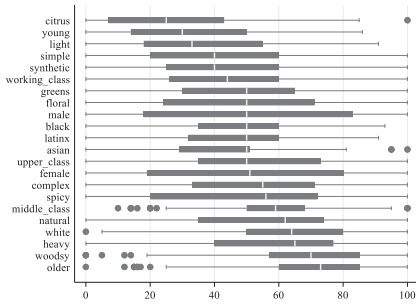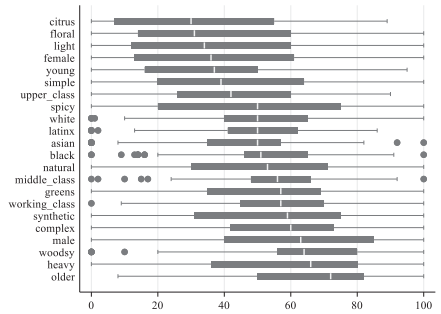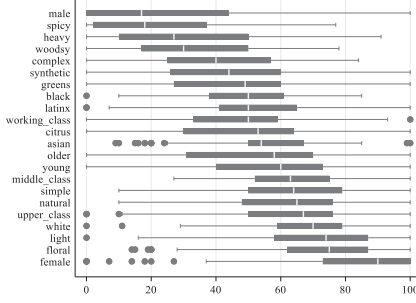
APPENDIX A

Fig. A1.   Results of Modularity Maximization for Olfactory Schemas. Note: the procedure shows a three-cluster solution as optimal, but the fit continues to gradually increase with additional clusters. This suggests that the derived schemas do not represent clearly distinct cognitive subcultures so much as positions along a continuum.
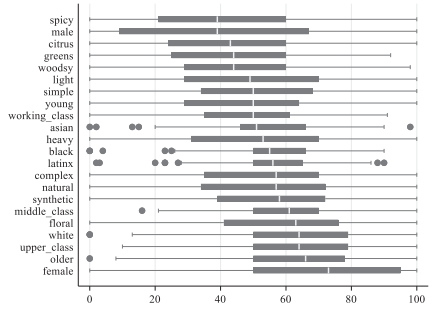
a Ambiguous 1

b Ambiguous 2

c Expensive Perfume

d Inexpensive Cologne

Fig. A2. Boxplots of Fragrance Interpretations Prior to Group Discussion. Note: the figure shows the responses for the first- and second-order interpretations of the fragrances for the 115 respondents. The characteristics are ordered for each fragrance from the lowest to highest mean response. The expense perfume shows the greatest overall clarity in interpretation with a clear ordering and smaller standard deviations.
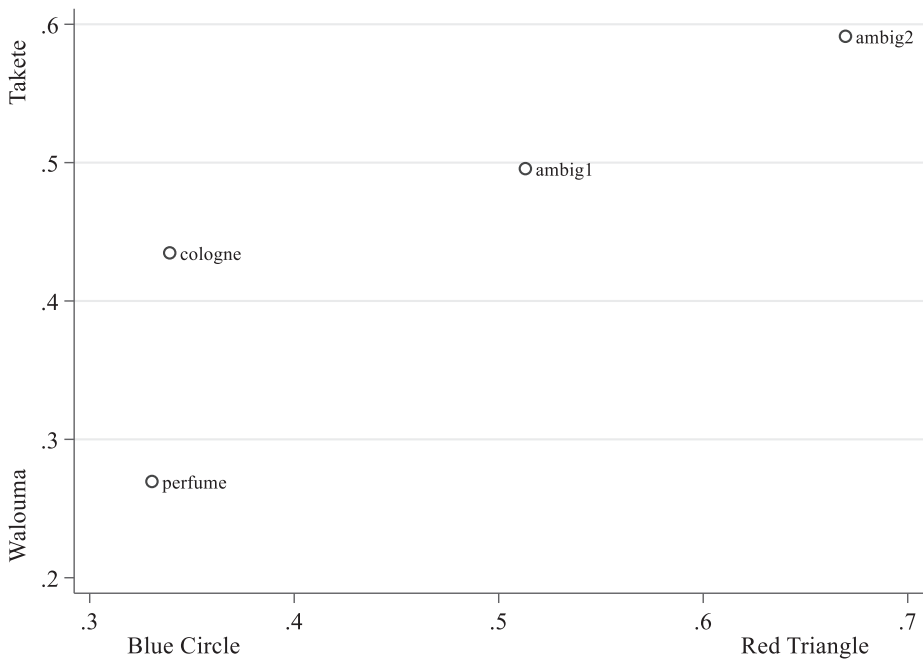
Fig. A3. Cross-Modal Inferences in Fragrance Interpretations. Note: the figure plots the average cross-modal inferences – i.e., how likely individuals were to intuit the branding of the fragrances in terms of nonsense words, and colored shapes. Here, we see non-olfactory stimuli shaping the interpretations of the fragrances. A clear pattern emerges: the more a fragrance is perceived as feminine the more it is associated with walouma and blue circle, while the more a fragrance is perceived as male the more it is associated with takete and red triangle. These correlations suggest that absent the cross-modal symbols that accompany a cultural object's intended interpretation, individuals can "reverse engineer" the basic building blocks of these extrinsic symbols in imagine names, shapes, and colors. Again, ambiguous fragrance 1 was the hardest to place, while the expensive perfume was the clearest to cross-modally situate.