# Underdeterminacy without ostension: A blind spot of the prevailing models of communication

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**ABSTRACT**

Together, the code and inferential models of communication are often thought to range over all cases of communication. However, their prevailing versions seem unable to fully explain what I call *underdeterminacy without ostension*. The latter is constituted by communication where stimuli that are not (nor appear to be) produced with communicative or informative intentions nevertheless communicate information underdetermined by the relevant codes. Though the prevailing accounts of communication cannot fully explain how communication works in such cases, I suggest that some version of the inferential model can—if we allow it to extend to non-ostensive, non-intentional behaviors.

**KEYWORDS**

Communication, ostension, underdeterminacy, code model, inferential model, emotional expression

# 1. INTRODUCTION

In *Meaning* (1957), Grice famously distinguished natural and non-natural meaning. This distinction has proven extremely influential although it has been shown that some cases of communication fall in neither one of the two groups, something which Grice himself foresaw (1957, p. 379). Notably, the meaning of nonhuman animal communicative signs and that of spontaneous emotional expressions sometimes is neither natural nor non-natural as Grice defined these terms (Armstrong, 2021; Bonard, 2023; Denkel, 1992; Wharton, 2003). It has been argued that these "neither natural nor non-natural" cases are better dealt with thanks to a distinction that is based on, though independent of, Grice's: They would be accounted for by either the code model or the inferential model of communication. The distinction between these models will be at the center of this paper (though I will come back to natural versus non-natural meaning in §4).

Although the terminology varies and the border between the two models is disputed, the assumption that the cases of communication left unexplained by the code model can be accounted for by the prevailing versions of the inferential model is widespread among communication theorists. It is common in philosophy of language (for a review, see Korta & Perry, 2020, Section 3) and in linguistics (for a review, see e.g., Schlenker, 2016, p. 664) where the code and inferential models are usually thought to correspond to semantics and pragmatics respectively. Beyond the study of language, some versions of these models sometimes are presumed to range over all cases of communication, for instance in the study of language evolution (e.g., Moore, 2017; Reboul, 2017; Scott-Phillips, 2015; Sterelny, 2017; Tomasello, 2008, Chapter 5), developmental psychology (e.g., Csibra & Gergely, 2009; Tomasello, 2008, Chapter 4), and primatology (e.g., Sievers & Gruber, 2016; Tomasello, 2008, Chapter 2).

In this article, my main aim is to draw attention to instances of communication that seem not to be fully explained by existing versions of both models—cases where, as far as I can tell, prevailing models of communication cannot account for how information is communicated. As we will see, this blind spot consists in communication where the relevant information is not encoded—and so where the code model doesn't apply—but where the relevant stimuli are not overtly intended for communication nor perceived to be so intended—and so where the

prevailing version of the inferential model don't apply either.[1] I will illustrate this blind spot with examples of spontaneous emotional expressions, in particular laughter, but it may well include other cases (see Bonard, 2021, Chapter 3). A secondary aim of this article will be to sketch a possible explanation for such cases (see Section 5—cf. related suggestions that I made in Bonard 2021, 2022).

# 2. THE CODE AND THE INFERENTIAL MODELS OF COMMUNICATION

## 2.1. The code model and natural codes

The code model analyzes the transmission of information in terms of a system consisting of a sender that encodes information into a stimulus which travels to a receiver who gets the information by decoding the stimulus. For the encoding–decoding process to work and the information to be transmitted, senders and receivers must use the same code. The code is a set of pre-established pairings between stimuli and pieces of information. They may be expressed as a set of sender's and receiver's rules in a sender-receiver game (see e.g., Skyrms, 2010).

Defined as such, codes need not be conventional, as in human languages: They can also be largely innate, like the ones proposed for vervet monkey alarm calls by Seyfarth, Cheney, and Marler (1980) and for facial expressions of emotions by Ekman (1993). These are examples of *natural codes* (Wharton, 2003): codes based on natural meaning (Grice, 1957), natural information (Stegmann, 2015), or natural selection (Skyrms, 2010) rather than on conventions. Plausibly, the code for laughter that will interest us in §3 is a natural code. Note that this characterization of the code model is broader than that given by Green (2007, Section 1.1.) or Scarantino (2013, p. 69). It includes both Green and Scarantino's theories of animal communication and spontaneous emotional expressions.

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[1] Let me highlight that some inferential theorists have recognized the contribution of non-coded, non-ostensive stimuli to what is communicated, which is in line with my conclusion. This topic has been discussed by relevance theorists (e.g., Dezecache et al., 2013; Sellevold, 2018; Sperber & Wilson, 1986, Chapter 1, 2015; Wharton, 2003, 2009; Wharton et al., 2021; Wilson & Wharton, 2006) as well as by other researchers (Bar-On, 2013; Green, 2007; Schlenker, 2022; Schlenker et al., 2016). However, there is nowhere a full account yet. This is, for instance, why Sperber (2019) invites researchers to study in more detail, among other subjects, communication beyond ostension. Thanks to a reviewer for stressing these points. I will come back to them in §4.

The code model is economical and applies to a wide range of cases, but it has one critical constraint: Codes must be shared by communicators before they communicate. This constraint limits their explanatory scope, as we will now see.

## 2.2. A first kind of underdeterminacy

At least since Grice's 1967 William James Lectures (1989, Chapters 1–7), it is widely recognized that linguistic communication cannot be entirely explained by the code model because the semantics of natural languages—what words encode—vastly underdetermines what speakers succeed in communicating with words. This is how Horn puts it:

> What a speaker intends to communicate is characteristically far richer than what she directly expresses; linguistic meaning radically underdetermines the message conveyed and understood. (Horn, 2004, p. 3)

As Horn, I use "underdeterminacy" to refer to the phenomenon whereby information is communicated (the message is "conveyed and understood") by a stimulus although it is not the case that this information is encoded in the stimulus—the stimulus is not paired with the information thanks to a pre-established code shared by the sender and receiver. In Horn's citation, what is encoded is linguistic meaning, but the relevant code can be of other sorts, as in natural codes.

A typical case of underdeterminacy is that involved in successful conversational implicatures. Let us briefly illustrate:

(1) – *Sam*: "Where is Joe?"
– *Maria*: "There is a little red Corvette in front of Maggie's house."

The relevant code— English grammar and lexicon—can only lead Sam to decipher a message detailing the location of a car, although this is obviously not all that Maria meant. Sam will moreover understand that Maria meant that Joe is at Maggie's.

The fact that codes underdetermine meaning is what led Grice and his heirs to develop a model of how information may be communicated without being encoded.

## 2.3. The inferential model

The prevailing inferential model includes influential and established theories of various sorts (Bach & Harnish, 1979; Grice, 1989; Horn, 1984; Levinson, 2000; Neale, 1992; Schiffer, 1972; Searle, 1969; Sperber & Wilson, 1986; Stalnaker, 1978; Strawson, 1964) as well as more recent ones (e.g., Davis, 2003; Heintz & Scott-Phillips, 2023; Roberts, 2018; Tomasello, 2008). They all share the following hypotheses:

(a) There are cases of successful communication that is not entirely based on codes that depends on the overt (or partly overt) display of informative intentions or of other communicatively relevant intentions, such as directive, interrogative, or expressive intentions.

(b) When receivers notice these intentions, they try to infer what senders intend to communicate (i.e. receivers engage in mindreading). They do so notably by following certain pragmatic principles (e.g., Grice's (1989) Cooperative Principle and maxims or other pragmatic principles such as Horn's (1984), Sperber and Wilson's (1986), and Levinson's (2000)).

(c) These inferences allow receivers to understand what is communicated beyond what the stimuli encode.

Thanks to these hypotheses, the inferential model can give sophisticated and satisfying explanations for cases where the code model fails to: cases of successful communication despite underdeterminacy. However, and this is important for the following, these explanations are limited to cases where hypotheses (a) to (c) hold and so, in particular, to cases where senders (at least somewhat) overtly display intentions, as per (a).

I call "ostensive stimuli" the stimuli that are (at least somewhat) overtly intended for communication and "ostension" the act of producing ostensive stimuli. Since Grice's (1957) seminal paper, many definitions of ostension have been proposed by inferential theorists (for reviews, see Bonard, 2021, Appendix; Green, 2007, Chapter 3).[2] To encompass different

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[2] Sperber and Wilson (1986, 2015) influentially define ostensive stimuli as stimuli that are intentionally produced to make it mutually manifest between sender and receiver that the sender has an informative intention, where an informative intention is an intention to make manifest or more manifest to the receiver an array of propositions. However, other researchers argue that ostensive stimuli should be defined differently. For instance, some argue that ostensive stimuli should not be defined solely with informative intention and that they can overtly display other illocutionary intentions instead (e.g., Bach & Harnish, 1979; Moore, 2017). Some argue that ostensive stimuli can be produced without the meta-representational intentions that Sperber and Wilson's definition requires (Green, 2007, Chapter 3; Moore, 2017). Some also point out that the inferential model can apply to cases where informative intentions are only weakly manifest (Heintz & Scott-Phillips, 2023, Section 8).

versions of the inferential model, I will characterize ostension broadly and only give a disjunctive condition: If X is an ostensive stimulus, then X overtly attracts the attention of the receiver to (a) the fact that the sender has an informative intention (making it at least weakly manifest) or (b) to some other communicationally relevant intention. For short, I will say that ostensive stimuli are stimuli overtly intended for communication.

Stimuli that fail to be ostensive cannot be explained by the prevailing versions of the inferential model through the pragmatic principles they postulate (e.g., Grice's Cooperative Principle, Horn's Q and R principles Sperber and Wilson's communicative principle of relevance, etc.). These principles can only apply if the receiver identifies, or thinks she identifies, stimuli overtly intended for communication. And if they cannot, then we are left without the powerful explanations based on these pragmatic principles of how we communicate information that is underdetermined by the relevant codes.[3]

To have a clearer idea of why this is the case, let me briefly go back to (1) and illustrate roughly, in a simplified way, how the inferential model accounts for it.

With the production of her utterance, Maria overtly shows that she intends to answer Sam's question. She thus makes it mutually manifest that she has the intention to inform him. Because Maria makes an informative intention mutually manifest, the information she encoded in the signal must be relevant to Sam's question: She must have said neither less nor more than necessary. In other words, because she evidently intends to communicate with Sam, pragmatic principles should apply to Maria's answer. Thus, the information she encoded in her utterance (namely, information about the location of a car) must be relevant to his question. This leads Sam to infer that Maria speaks of Joe's car.

In sum, the inferential model gives a powerful explanation of how one can communicate pieces of information that go beyond what is encoded in the stimuli that one uses. They satisfyingly explain many cases of code underdeterminacy. However, these cases are limited to ostensive communication. This constraint limits the explanatory scope of the inferential model.

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[3] Among contemporary pragmatists, those who have most insisted on this point probably are relevance theorists, but see also, for instance, Roberts (2018). As I mentioned above, however, inferential theories may nevertheless use other tools of theirs to explain how non-ostensive behavior contributes to communication. For instance, relevance theorists have given partial explanations of communication thought non-ostensive, non-coded stimuli. I will come back to this in §4.

# 3. UNDERDETERMINACY WITHOUT OSTENSION

In this section, I will argue that there are cases of communication that are fully accounted for by neither the prevailing versions of the code nor of the inferential model. They constitute what I call "underdeterminacy without ostension" following the characterizations of these terms given above. I will focus on spontaneous emotional expression and concentrate in particular on laughter, but other types of communicative stimuli may well belong to this set (see Bonard, 2021, Chapter 3).

I choose laughter as an example for several reasons. First, codes for laughter are empirically well-studied (see below). Second, cases of non-ostensive, non-intentional laughter are common, more common than those that are ostensive (Provine, 2001, 2017). Third, laughter is widely recognized to be a communicative stimulus (Gervais & Wilson, 2005): a type of stimulus that has evolved with the function to transmit information from a sender to a receiver where both the sending and the receiving of this information transmission were designed for it (this claim is based on a widespread definition of communication, see e.g., Green, 2007; Skyrms, 2010). Fourth, laughter is a non-conventional form of emotional expression that is culturally universal (Sauter et al., 2010) and even shared with other species (Panksepp & Burgdorf, 2003). This distinguishes laughter from conventionalized emotional expressions such as interjections ("Wow!", "Yuk!", etc.) or emotional gestures (thumbs up, middle finger, etc.). This is relevant because non-ostensive uses of non-conventional emotional expressions have been thought to be accounted for by the code model (Dezecache et al., 2013; Moore, 2017). I will suggest that this is not always true.[4]

Let us turn to what a code model can tell us about the meaning of laughter. A first attempt at designing a code for laughter could be based on the idea that laughter naturally means mirth. Laughter (as a type) is not factively related to mirth since one can feign mirthful laughter and so does not naturally mean mirth according to Grice's (1957) factive definition. However, one may hypothesize that laughter naturally means mirth under a probabilistic understanding of natural meaning (see Bonard, 2023 for an analyzis of how natural meaning and probabilistic accounts of natural information can deal with emotional expressions). Because senders and

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[4] Note however that non-ostensive emotional expressions can also be used as part of ostensive communication and, as such, has been studied as part of the inferential model (e.g., Wharton 2003, 2009). I will come back to this in §4.

receivers would both know that (implicitly), they would share the association, established before the communication takes place, between the stimuli making up laughter and the information that the laugher is mirthful. This would constitute the natural code that explains how senders and receivers update their common ground when the receiver perceives the sender's laughter.

This code however is insufficient. Laughter does not only express mirth, even if we focus on non-ostensive laughter. Poyatos (2002, pp. 71–76) lists ten different communicative functions that laughter can play, including the expression of negative affective states such as embarrassment or aggressiveness.

Consequently, some researchers have attempted to create codes pairing different affective states with different types of laughter, focusing on acoustic stimuli (for reviews, see Bonard, 2021, Chapter 1; McGettigan et al., 2015). In light of these empirical investigations, it appears that the best that a code model for the sounds of laughter can do here is to offer a statistical association—a natural code—between only two pairs: First, the acoustic cues making up what I will call *Duchenne laughter* is statistically paired with positive affective states and, second, *non-Duchenne laughter* is paired with a heterogenous set of affective states (see Table 1). In other words, if we use 'naturally means' in a probabilistic sense (Bonard 2023; Stegmann, 2015), then, as far as we know, Duchenne laughter naturally means positive affective states, non-Duchenne laughter naturally means a heterogenous set of affective states, and there are no other acoustic categories of laughter that would naturally mean types of affective states. Let me underline that the empirical literature thus seems to show that we cannot acoustically distinguish between, say, nervous laughter, sardonic laughter, embarrassed laughter, and so forth (in §4, I will discuss attempts at devising a more sophisticated code using non-acoustic cues).[5]

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[5] Note that the distinction that I make between Duchenne and non-Duchenne laughter is based on acoustic features. It should not be mixed with a distinction between intentional (a.k.a. volitional) and non-intentional (non-volitional, spontaneous) laughter, though the two distinctions are related statistically and evolutionarily (Gervais & Wilson, 2005). These two distinctions are orthogonal: Both Duchenne and non-Duchenne laughter can be produced intentionally by certain people (e.g., actors) and both are most often produced non-intentionally (Gervais & Wilson, 2005). Furthermore, both Duchenne and non-Duchenne laughter, whether it is intentional or not, can be used to communicate ostensively, for instance when one ironically echoes the spontaneous equivalent or ostensively shows one's unintentional reaction (Wharton, 2009, Chapter 2). Now, the cases of Duchenne and non-Duchenne laughter that I will discuss are to be construed as non-intentional and as non-ostensive. I will come back to intentional vs. intentional laughter in §4.

| Information encoded | Stimuli |
|---|---|
| Positive affective state (mostly mirth, but also joy, relief, or playfulness) | Acoustic stimuli of Duchenne laughter (louder, higher-pitched, lasts longer, more calls per bout, …) |
| Amusement, contempt, fear, incredulity, joy, sadness, Schadenfreude, social anxiety, urge to affiliate, urge to aggress, ticklishness. | Acoustic stimuli of non-Duchenne laughter (softer, lower-pitched, briefer, fewer calls per bout, …) |

**Table 1.** The best code available for the sounds of laughter according to a review of empirical studies (see Bonard, 2021, Chapter 1).

The code from Table 1 can by itself successfully account for some cases of communication: There certainly are cases where all that is understood by the audience hearing Duchenne laughter is that the person laughing is undergoing a positive affective state. And there certainly are cases where the audience only understands that the person producing non-Duchenne laughter is undergoing one or the other affective states listed in Table 1.

However, in most cases, this code fails to give a satisfying account of the information transmitted by laughter. This is so for at least two reasons. First, we usually understand what emotional state laughter expresses more precisely than what Table 1 can tell us – for instance, we understand that Joe's laughter expresses *amusement* or that Maggie's laughter expresses *embarrassment*. Second, furthermore, we usually understand what the emotional state is about – for instance, we understand that Joe's amusement is about *how the dog walks*. Importantly, this is also true for non-ostensive laughter.

We can illustrate these points in more detail with example (2). Let us construe it as displaying spontaneous laughter, as one of those typical cases where the laughter is not ostensive: It is not, nor appears to be, overtly intended for communication. More specifically, it should be conceived as being produced without any communicative nor informative intention, nor with any communicatively relevant intention. It is a case of spontaneous, non-intentional, emotional reaction that is not intentionally shown (more on this in §4):

(2) – *Emily, on the phone*: "Is your wife going to join us?"
– *Frank*: "Actually, she is calling the doctor to see if she can meet him about her gastroenteritis. Huhuh. Heh. Huh. (low pitched, soft)"

– *Emily*: "I will keep that to myself."[6]

A code model would predict that since Frank's laughter is more like non-Duchenne than Duchenne laughter (being low-pitched and soft) he sends an acoustic stimulus that carries the information that he is either undergoing amusement, contempt, fear, incredulity, joy, sadness, Schadenfreude, social anxiety, an urge to affiliate, an urge to aggress, or ticklishness. But this is not a satisfying account of what Frank communicates with his laughter. We[7] readily understand Frank's laughter to express the following (among other things):

(p) Frank is embarrassed (he laughs out of embarrassment).

(q) His embarrassment concerns the private information about his wife that he has just revealed.

The best prediction available to a code model, if we trust the empirical investigations behind Table 1, cannot explain the fact that the messages conveyed by, and understood from, the laughter include (p) and (q). Non-ostensive laughter communicates more than the information made available by the relevant code.

As such, case (2) can be compared to case (1) where the information encoded in the utterance does not exhaust the information transmitted to a typical receiver—where the relevant code underdetermines the meaning. However, it is different from (1) because the explanation based on pragmatic principles available to the inferential model does not apply. This is because case (2) is a case where laughter is not, nor appears to be, (part of) an ostensive behavior: We must construe Frank's laughter so that he does not laugh, nor appears to laugh, in order to overtly inform Emily of (p) and (q) or to overtly perform any other intentional communicative function (I discuss below why it is reasonable to construe this example as non-ostensive). Nevertheless, both Emily and Frank can take these pieces of information to have been communicated by the laughter and that this is mutually manifest.

Here is another example. Once again, let us construe it so that the laughter is not produced, nor appears to be produced, with any intention to communicate or inform. It is a spontaneous, non-intentional, emotional reaction that is not intentionally shown:

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[6] The example is adapted from a corpus example given by Ginzburg et al. (2015).
[7] To be cautious, I should restrict "we" to myself, the colleagues, and the audiences I have discussed this example with.

(3) *Context: David and Chuck are good friends, who share progressive, politically left-wing, values.*

– *David, on the phone*: "You know, I was thinking: maybe Sarah Palin is the future of the Republican party…"

– *Chuck*: "Hh hh, heh heh heh, 11uhuh, hahahahaha (high pitched, loud)"

– *David*: "…I even think she's got her chances for the next election." [8]

The context and the conversation in (3) make it plain that what Chuck's laughter communicates includes the following three pieces of information:

(r) Chuck is amused.

(s) Chuck's amusement concerns David's prediction.

(t) Chuck does not take David's prediction very seriously.

Once again, a code model does not come close to being able to account for this. Even if the code can thus tell us that, because the laughter is rather Duchenne-like (long, high-pitched, loud), Chuck is probably undergoing a positive affective state (such as mirth, joy, relief, or playfulness), this does not suffice to account for the fact that his laughter communicates (r)–(t). That Chuck undergoes a positive affective state is coherent and complementary with (r)–(t) and can be considered as further information that is carried by the laughter:

(u) Chuck undergoes a positive affective state.

A code model can account for (u) and thus for some of what Chuck's laughter communicates, but it cannot account for all that it communicates.

It is easy to multiply examples with laughter. And we can also easily multiply examples for other emotional expressions because codes for emotional expressions generally underdetermine their meaning (Bonard, 2023). Smiles encode as many emotions as laughter does, perhaps more (Krumhuber & Manstead, 2009). Sighs encode relaxation, relief, sadness, or stress (Vlemincx et al., 2009). We cry when we are sad or moved. Even Ekman's supposedly universal facial expressions of emotion convey different emotions in different contexts (Barrett et al., 2011). And none of these emotional expressions encode what the emotions are about (Bonard, 2023).

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[8] Adapted from Ginzburg et al (2015, p. 137).

As with laughter, there are good arguments to be made that these emotional signs have evolved as communicative signals and that it is their function to communicate the affective states they express and what these states are about. Now, many cases of emotional expressions are non-ostensive; they are not overtly intended for communication nor intentionally shown. They do not even make partially manifest an informative intention. They are mere spontaneous, non-intentional, non-ostensive, emotional reactions (more on this in §4).[9]

Let me observe that my argumentation in this section was essentially the same as that in Section 2 where I presented how codes underdetermine meaning with the conversational implicature in (1). In other words, the reasons I gave for thinking that the code model cannot account for cases (2) and (3) are of the same kind as the ones which led Grice and his heirs to think that the code model cannot account for some cases of linguistic communication. Namely, I claimed that in all three cases there does not seem to be a code that is sufficient to account for the information that is carried by the stimuli used because this information is too idiosyncratic to the situation and seems to be inferred based on abductive reasoning, mindreading abilities, and a common ground. In other words, the code model fails in the same way for (1), (2), and (3). So, if one agrees with the uncontroversial claim that the code model fails for conversational implicatures, according to my argumentation, one should be led to agree that it fails for certain stimuli that are not overtly intended for communication.

I have furthermore pointed out that the explanations based on pragmatic principles provided by the prevailing versions of the inferential model apply to (1) but not to (2) and (3) due to the non-ostensive, non-intentional nature of the laughter that (2) and (3) involve.

For these reasons, I have claimed that these are cases for which the prevailing versions of both the code and the inferential models fail to give a satisfying explanation of what is communicated. I will now address some objections before I turn to a sketch for an account that could explain (2) and (3).

## 4. OBJECTIONS AND RESPONSES

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[9] On ostensive emotional expressions and how they related to non-ostensive emotional expressions, see Bonard and Deonna (2023).

A first objection is that cases like (2) and (3) are not cases of communication and that, if it is not communication, then it is normal that the code and the inferential models do not give satisfying explanations of these cases. After all, these models were designed to explain communicative phenomena.

As said above, laughter is widely recognized to be a communicative stimulus: It is considered to be a type of stimulus that has evolved with the function to transmit information from a sender to a receiver where both the sending and the receiving of this information transmission were designed for it (for this widespread definition of communication, see e.g., Green, 2007; Skyrms, 2010). And laughter's communicative function certainly includes the transmission of both what affective state it expresses and what the affective state is about (Gervais & Wilson, 2005). Furthermore, the literature on what laughter expresses (see Table 1 above) clearly makes use of the code model of communication, often with explicit references to Shannon (1948) or Brunswik (1956). More generally, the codes used in affective sciences to account for the communication of emotions are analogous to the one presented in Table 1 – see for instance Ekman (1993) for facial expression, Scherer (2003) for vocal expression, or Juslin and Laukka (2003) for musical expression. Non-ostensive emotional expressions (when they are not part of an ostensive behavior) have been considered accountable by the code model by many researchers, including linguists and philosophers (e.g., Dezecache et al., 2013; Scott-Phillips, 2015, Section 1.2; Sterelny, 2017, p. 824; Wharton, 2003). In philosophy, theories of communication that are built on notions such as probabilistic meaning (e.g., Scarantino, 2013; Skyrms, 2010) or teleosemantic meaning (e.g., Millikan, 1984) also belong to the code model as I have described it above, since they are essentially based on pre-established pairings between kinds of stimuli and pieces of information (these links being established through learning or natural selection).[10]

A second objection is that we can account for the information transmitted in (2) and (3) through the notion of natural meaning, just like in the following example: If we are together in a room and see black smoke emanating from the toaster, our common ground will be updated with the information that the bread is burnt, because we both know that seeing black smoke emanating from a toaster naturally means this. See also the famous goat example discussed by Stalnaker (1978). What happens with Frank and Chuck's laughter would be similar.

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[10] For the claim that Millikan's theory is a (sophisticated) version of the code model, see Reboul (2017, Section 2.4.1.). Another sophisticated version of the code model is proposed by Armstrong (2021).

There are two problems with this objection, depending on whether we interpret it to be about a type or token laughter. The first interpretation is that laughter, as a type of acoustic stimulus, naturally means the information transmitted in (2) or (3) and that the participants in the conversation know that. The problem here is that this is simply not true. There are two ways of cashing out the notion of natural meaning. Either as a factive relation (e.g., Grice, 1957) or as a probabilistic relation (for a review of probabilistic accounts, see Stegmann, 2015). Let us call them meaning$_{\text{NAT-FACTIVE}}$ and meaning$_{\text{NAT-PROB}}$. Now, the participants in the conversation do not think that laughter as a type means$_{\text{NAT-FACTIVE}}$ the information transmitted in (2) or (3) because they know that such laughter types may be instantiated in situations where what is transmitted in (2) or (3) is not the case (Bonard, 2023). We cannot either explain the information transmission with the hypothesis that the participants believe that laughter means$_{\text{NAT-PROB}}$ the information transmitted because it is too idiosyncratic to be accounted for through probabilities, as we have seen above. The probabilistic correlation between laughter as a type of acoustic stimulus and the specific information transmitted in (2) or (3) is very low, and it is much lower than the probability that this type of stimulus correlates with many other pieces of information that are not communicated in (2) or (3).

The second way to interpret the objection is that the particular token of laughter, not the laughter type, naturally means the information transmitted in (2) or (3). Now, this idea cannot work with the notion of meaning$_{\text{NAT-FACTIVE}}$ because both Frank and Chuck may well be faking their laughter, feigning to express embarrassment and amusement, and still communicate the relevant information (they may be good actors). But we may conceive of the laughter tokens as meaning$_{\text{NAT-PROB}}$ the information they transmit in the sense that, given all that we know from the context, it is highly probable that Frank is embarrassed about the private information he revealed and Chuck is amused by his friend's remark.

The problem with this claim is not that it is wrongheaded, but that it is unhelpful for us because it indiscriminately boils the notions of natural and non-natural meaning into a heteroclite whole. Indeed, we may just as well say that Maria's utterance in (1) (i.e., "There is a little red Corvette in front of Maggie's house") considered as a particular token utterance and not as a sentence type, means$_{\text{NAT-PROB}}$ that Joe is at Maggie's house because, given all that we know from that utterance and its context (e.g., that Maria is a pragmatically competent agent, that she knows Joe's car, that she is honest, etc.), it is highly probable that Joe is at Maggie's house. In other words, this objection claims that all cases of communication are cases of meaning$_{\text{NAT-PROB}}$ where the sender and the receiver share a natural code that probabilistically

pairs the relevant context (which includes in some cases assumptions about the mental states of the participants, their pragmatic competence, etc.) with the information transmitted.

I have no problem conceding this point. The problem though is that it lacks informativeness for our purpose. The inferential and the code models discussed in Section 2 make much more detailed claims about what are the variables that are needed to explain communication. For instance, theories belonging to the inferential model explain (1) through specific concepts such as conversational implicatures, pragmatic principles, common ground, literal meaning, and so forth. It is at this fine-grained level of explanation that we want to account for (2) and (3). Saying that cases (1)–(3) are all based on the meaning$_{\text{NAT-PROB}}$ of the token signs together with their context is plausibly true, but not it is not satisfying (all meanings are plausibly based on the meaning$_{\text{NAT-PROB}}$ of the token signs together with their context).

Third objection: We can account for the cases discussed above through a more sophisticated code model than the one presented in Table 1. For instance, we may hypothesize that the communication can be explained with a code that would pair information with, on the one hand, the acoustic cues of the laughter and, on the other hand, contextual stimuli to be spelled out. For instance, one could attempt to analyze for (2) by listing contextual stimuli typically associated with negative emotions (foul smells, loud noises, rapid and unpredictable movements, great heights, …) and then associate these stimuli with laughter to obtain the following code:

- typical negative stimuli + non-Duchenne laughter (stimuli) => expression of negative emotion (information encoded)

First problem: It is hard to imagine a list of stimuli typically associated with negative emotions where the stimuli are also never associated with positive affective states. Think of cases where positively valenced emotions are about typically negative stimuli, for instance someone laughing out of Schadenfreude or mockery. Second problem: The typical stimuli would not include relevant idiosyncratic stimuli such as the nervous laughter of someone being afraid of teddy bears. Third, and worst, problem: Even if we could build this code, it will not be enough to account for all the information that laughter communicates. Such a code is not precise enough to yield the pre-established association needed between, for instance, Frank's laughter and the fact that Frank's laughter expresses an embarrassment *that concerns the private information about his wife that he has just revealed.*

Once again, the information communicated in (2) as well as in (3) seems too idiosyncratic for any code. In any case, the burden of the proof rests on those who claim that a non-ad-hoc code—that is, a non-ad-hoc pre-established pairing between kinds of stimuli and pieces of information shared by communicators—could predict what is communicated in (2) and (3). Until one has devised or has indicated how to devise such a code, the code model fails to give a satisfactory account.

It intuitively seems that, to understand what Frank and Chuck's laughter communicate, the receiver needs to perform abductive reasoning based on expectations of rationality, a common ground, some pragmatics principles, and a few other assumptions similar to the ones found in the existing inferential model. However, since the laughter in (2) and (3) is not ostensive nor appears to be so, the information that such laughter carries is out of the scope of the typical explanations provided by existing inferential theories.

Let me now turn to objections against this last claim. The first objection of this sort is to claim that Frank's or Chuck's laughter *must* be ostensive in some sense.

In response, let me first emphasize that, for my argument to be sound, it does not need to be the case that laughter is never ostensive—this is obviously false. There only need to exist *some* cases where laughter is not ostensive and does not appear to be, but where we nevertheless understand it to communicate more than what a code model can predict. I claim that (2) and (3) can realistically be construed as such. I recognize that the words I have used in (2) and (3) could also be used to describe other possible scenarios where the person laughing does so with an overt (or partially overt) informative intention. We only need to allow that (2) and (3) are *possible* descriptions of laughter that is not, nor appears to be, (overtly) intended for communication but that nevertheless communicates (p)–(t).

It should also be stressed that spontaneous emotional expressions may well be used in ostensive communication—for instance, one may non-intentionally produce emotional expression but ostensively show it to one's audience. Furthermore, ostensive behavior may convey information in non-ostensive ways. For instance, a non-ostensive (affective) tone may modulate what an ostensive utterance communicates. Such cases have been analyzed in detail by an existing inferential model, namely relevance theory (e.g., Sperber & Wilson, 1986, Chapter 1, Section 10; Sperber, 2019; Wharton, 2003, 2009; Wilson & Wharton, 2006). However, the laughter in examples (2) and (3) is to be construed as belonging to neither of these

two categories: It is not used ostensively nor is it part of an ostensive behavior. It is fully non-ostensive and, in fact, fully non-intentional. To back up the claim that this is a realistic construal of (2) and (3), I will say more about the nature of intentions below.

A further objection is that some existing version of the inferential or quasi-inferential model may explain the communication in (2) or (3) without requiring the laughter to be ostensive. Responses of several kinds are needed here.

First, as already noted, inferential theories have been applied to study non-ostensive stimuli—in particular within relevance theory (e.g., de Saussure & Wharton, 2020; Dezecache et al., 2013; Sellevold, 2018; Sperber & Wilson 1986, Chapter 1, Section 10; Sperber 2019; Wharton, 2003, 2009; Wharton & Wilson, 2006; Wharton et al., 2021). These authors have notably shown how the tools developed by relevance theorists and their collaborators can be usefully applied to non-ostensive emotional expressions—for instance, the cognitive principle of relevance (e.g., Wharton et al., 2021), epistemic vigilance (e.g., Sellevold, 2018), and non-propositional effects (e.g., de Saussure & Wharton, 2020). However, as far as I can tell, these accounts either are not directly concerned with the problem of underdeterminacy without ostension or do not provide an explanation of this phenomenon that would fully explain it. In particular, they seem to fall short of explaining how laughter in (2) and (3) communicates (p)–(t).[11]

Other (quasi-)inferential theories have discussed cases of underdeterminacy without ostension, but they too cannot fully explain how the laughter in (2) and (3) communicates (p)–(t). For instance, Schlenker et al. (2016)'s monkey pragmatics does not require ostension, but their Informativity and Urgency Principles are not sufficient to explain our cases. The same is true of Armstrong's model of "minded communication" (2021). By contrast with their cases, the communication in (2) and (3) requires sophisticated mindreading abilities. However, Armstrong's discussion of the flexibility of non-intentional communication (p. 5) is a fruitful point of contact (cf. §5 and my discussion of control).

Other versions of the inferential model fail to explain our cases because, although they do not require full-blown ostension, they require intentions that are absent from (2) and (3). For instance, Davis's (2003) account of expression does not require multiple (or iterative) intentions

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[11] An exception may be Bonard (2022), whose argument however broadly supports the present one. He also proposes an extension of prevailing inferential theories.

(contrary to neo- and post-Gricean theories), but it would have required that Frank and Chuck intended their laughter to be indications of occurrent mental states of theirs,[12] which is not the case (more on this below).

Another account that should be mentioned here is Heintz and Scott-Phillips' (2023). They argue that "pragmatics should be characterised as the study of how, and the many means by which, informative intentions are satisfied" (p. 33). They show how the ostensive-inferential model extends to cases where an informative intention is made only weakly manifest. They notably discuss "coordination smoothers" (Section 8.1.) that are used when people dance or carry objects together. These are subtle evidence for informative intentions that facilitates the flow of information for joint actions while being only weakly manifest to the communicators (p. 27). In their discussion of the communicative function of punishments (Section 8.3), they also highlight how there can be forms of (quasi-)ostensive communication where the informative intention is not strongly manifest to any of the communicators. They discuss a continuum of cases between fully-fledged ostension and the expression of informative intention without communicative intention (Section 3). Cases with weakly manifest informative intentions fall in between (Section 8).

They do not claim it explicitly, but it is clear that their account extends to many cases of emotional communication, including laughter. However, their focus is restricted to cases where senders behave so as to make informative intentions manifest, even if weakly. As such, their discussion of "unleashed expression" does not apply to (2) and (3) since these examples are to be construed as cases where laughter is produced with neither communicative nor informative intentions. Given that Heintz and Scott-Phillips use a broad notion of intention, it is worth saying more about this last claim.

Can cases such as (2) and (3) realistically be construed, as I claim, as cases where laughter is produced without any informative or communicative intentions? The answer depends on what intentions are. I believe that my examples are plausible because the main accounts of intentions define them through features that can realistically be hypothesized to be absent from laughter, as we will now see, and there is no reason to doubt that this doesn't apply to the laughter in (2) and (3) .

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[12] This requirement stems from how Davis defines "S did A as E" (2003, p. 48) and "expression" (2003, p. 59).

- *Non-automaticity.* It can be as automatic to laugh as it is, in normal circumstances, to breathe, sneeze, or blink. Even if we might be able to control it to a certain degree, we let such automatic behavior happen, without intending it to happen. For instance, even if we could have refrained from sneezing, we may sneeze without intending to sneeze. This is why O'Shaughnessy (2008, p. 359ff) contrasts "the *semi-helpless inclinatory phenomenon* of laughter" with intentional actions and even sub-intentional ones (359). Note that this is so even though O'Shaughnessy has a very wide notion of what counts as a (sub-)intentional action.

- *Practical reasons.* Sometimes, perhaps most of the time, when one laughs, if oneself or a third person tries to figure out one's reasons for laughing, one does not find that the laughter was produced with an intention to communicate or to inform. In such cases, communication is not the reason for one's laughter and, according to the common view that intentional actions are actions performed for a reason, this indicates that the laughter is not intended for overt communication (see e.g., Davidson, 2001, Chapters 1–5).

- *Action plans.* Relatedly, in such cases, the means-end format typical of, and perhaps essential to, intentions is absent: It is not true that we laugh as a means to fulfill a communicative or an informative intention (see e.g., Bratman, 1987).

- *Accessibility to consciousness.* Pacherie and Haggard (2010) reject that all intentions must possess any one of the preceding three traits, but maintain that intentions possess a certain phenomenology that is accessible to consciousness. However, we may well laugh without access to the phenomenology associated with intentions to communicate or to inform.

- *Causality.* On a causal account of intention such as that favored by Davidson (2001) or Searle (1983), we have once again reasons to consider that we laugh without communicative or informative intentions because the etiology of laughter in many cases is emotional rather than intentional. Indeed, it is widely accepted that emotions can cause expressions (facial, vocal, etc.) without intentions (Scherer & Moors, 2019, Section C).

In sum, even though there certainly are cases where laughter is (or merely appears to be) produced with an intention to communicate or to inform, for my argument to be sound, we just need to accept that (2) or (3) can be realistically construed as involving laughter that is not

intended to inform or communicate anything. Because laughter can be produced without any of the features of intentions mentioned, this requirement seems acceptable.

Here is a last objection: One may agree with the preceding, accept that prevailing models of communication have a blind spot , and further claim that there must exist some other kind of pragmatic theory that can account for how the information (p)–(t) is communicated without requiring communicative or informative intentions.

I am in complete accordance with this claim, but I do not think there is any such theory that has been fully developed as of yet—though I have tried to lay the groundwork for such a theory in Bonard (2021, Chapter 2). In a nutshell, I believe that we may give an explanation of how we communicate information that is not encoded in non-ostensive emotional expressions that is quite similar to the one provided by the existing inferential model. "Similar" insofar as it would appeal to something like a common ground between senders and receivers and to abductive inferences based on some rationality-based principles, some extended version of existing pragmatic principles. In other words, I believe that the theoretical constructs of the existing inferential models can be modified to apply to cases that do not involve overt communicative intentions; that some to-be-worked-out inferential account can extend beyond ostensive–inferential communication and in fact beyond intentional behavior. This is not trivial and I hope that future works can help tackle this task.

## 5. A SKETCH FOR A PRAGMATICS WITHOUT INTENTIONS

Let me sketch, using broad brush strokes, an attempt at adapting Grice's derivation of implicature (1989, p. 31) to cases of underdeterminacy without ostension and, in fact, without intention. This sketch resembles Grice's explanation in many ways but, critically, it does not appeal to communicative nor informative intentions. Here is the skeleton that I have in mind (I will then illustrate it):

(i) Sender S produces a stimulus x and this is mutually manifest to S and receiver R.

(ii) S does nothing to prevent x from generating beliefs (or other effects) in R.

(iii) R decodes x, but a mere decoding of x is not a satisfying rationalization of S's behavior, given their common ground and some assumptions about how a rational agent would act in such circumstances.

(iv) R has no reason to think that S behaves in ways that cannot be rationalized. R is thus led to make new hypotheses about other pieces of information that x may carry besides, or instead of, what is encoded in x according to the relevant (natural and conventional) codes shared by R and S.

(v) Hypothesizing that x carries information p in addition to, or instead of, what x encodes permits the best available rationalization of R's behavior.

(vi) Because S can know that R can make this hypothesis and that (as per (ii)) S has done nothing to prevent R from making this hypothesis, R can reasonably conclude that S has allowed x to carry the information that p; p may thus be added to their common ground.

I am not suggesting that this sketch is what happens in the minds of communicators in cases like (2) and (3) (Grice's "calculation" is only meant as a rationalization). What I am suggesting is that there is hope to extend a Gricean-like inferential model to account for cases of underdeterminacy without ostension and without intention. Let me give some hypothetical flesh to this skeleton with example (3):

(i) Chuck has laughed in response to David's prediction about Sarah Palin and this is mutually manifest to Chuck and David.

(ii) Chuck does not provide an excuse or an explanation after his laughter or any other behavior that is meant to cancel the beliefs that David could form in response to his laughter (he could have said "I'm sorry, I'm tired, it was a nervous laughter, it does not mean anything", or shown nonverbally that he wanted to suppress his laughter, etc.).

(iii) David decodes the laughter thanks to the natural code according to which Duchenne laughter is the signal of a positive affective state toward its object. He knows (implicitly) that Chuck too masters this code. However, this is not a satisfying rationalization of Chuck's behavior because Chuck possesses left-wing, progressive values that are threatened by the possibility of Sarah Palin being the future of the Republican party. So, he probably is not, and does not want to appear as, undergoing a positive affective state toward this possibility.

(iv) David has no reason to think that Chuck behaves in ways that cannot be rationalized. David is thus led to make hypotheses about pieces of information that the laughter may carry besides, or instead of, the fact that Chuck is undergoing a positive affective state.

(v) David makes the hypothesis that the laughter carries the following information: Although Sarah Palin being the future of the Republican Party could be considered a threat to people defending liberal values, Chuck does not think she really is one. Chuck laughs because he is amused that David and other people may think so. (We are often amused by situations where what we consider to be harmless appears to others as a real threat.)

(vi) Because Chuck is aware that David can make this hypothesis and that he has done nothing to prevent David from making it, David can reasonably conclude that Chuck has allowed his laughter to carry this information and it may now be added to their common ground.

Let me highlight once again that this explanation is very much like that given by a Gricean-like inferential model insofar as it postulates mindreading capacities based on an expectation of rationality and a goal-directed behavior as well as a shared code. However, it does not require ostension or intention. Instead of intentions, it appeals to the idea that the sender of the sign *could have controlled* their behavior. Instead of intentional communicative behavior, what is relevant here is the absence of inhibition and the absence of further communicative behavior. The phenomenon of interest thus is not speaker-meaning—elsewhere, I have proposed to call it *allower-meaning (*Bonard 2021, Chapter 2).

The phenomenon in question is similar to what Recanati called "non-intentionally implying" (Recanati, 1987, p. 122). Recanati makes the distinction between non-intentionally and intentionally implying, and then between intentionally implying and overtly implying. He does so to define indirect speech acts with the notion of overtly implying. Unfortunately, he does not elaborate further on non-intentionally implying, but the latter could serve as a basis for an inferential model that extends beyond ostension.[13] As he remarked (personal communication), the stimuli used for non-intentionally implying in my examples are non-ostensive according to the definition given above, but they share some properties with ostensive stimuli—in particular, the fact that the sender can control their production is publicly accessible.

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[13] However, the notion he offers would need to be slightly adapted to apply to our cases.

For this reason, we may call these non-ostensive stimuli "sub-ostensive" (a proposition which Deirdre Wilson also liked (personal communication)).

How large is the set of sub-ostension? We could include in it the behaviors discussed by Heintz and Scott-Phillips (2023, Section 8) where informative intentions are only made weakly manifest[14] as well as what Sperber (2019, p. 18) calls "proto-ostension", that is, "a form of interaction where A draws B's attention to some state of affairs in a manifestly intentional way and this elicits in B the expectation that this state of affairs is relevant to him or her". Like the cases I have discussed, proto-ostension does not require the communicative intention defining ostension. However, unlike proto-ostension, sub-ostension also includes cases where there are no informative intentions at all, as in (2) and (3), but where the control attributed to the sender by the receiver nevertheless suggests an (extended) inferential account.

Before we turn to the conclusion, I will mention a few reasons why the explanation sketched in (i)–(vi) is as of yet unsatisfying (for proposals on these three points, see Bonard, 2021, Chapters 2 and 3).

First, it may be objected that we need a psychologically realistic explanation of what happens but that this one is not, notably because it requires high-order meta-representations. Indeed, it is plausible that laughter is interpreted through a simpler, cognitively less demanding process than that suggested by steps (i)–(vi). At the very least, even if steps (i)–(vi) are meant as a rationalization rather than a psychological explanation, defending this explanation would need to address the worry of overintellectualizing the interpretation of spontaneous emotional expressions.

Second, even if this explanation were on the right track, steps (i)–(vi) only constitute a very rough sketch. If we wanted to have an explanation as detailed as the ones given by the existing inferential model, much work would be needed to complete it. For instance, since the pragmatic principles proposed by Grice, Horn, Sperber and Wilson, or Levinson are tailored for ostensive communication, they are too restrictive for the cases that interest us. Even the very general Principle of Effective Means proposed by Kasher (1982, p. 32) is restricted to

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[14] Understood as such, sub-ostension may serve as a point of contact with Heintz and Scott-Phillips' account as it would bring together the nonintentional cases discussed here and the continuum they discuss between fully-fledged ostension and what they call "mere expression", which does not require intentions. Thanks to a reviewer for this suggestion.

intentional actions and excludes cases like (2) and (3). New pragmatic principles for such a non-ostensive-inferential model would need to be determined.

Third, the scope of such explanations would need to be delineated: It must be broader than ostension, but cannot be boundless, otherwise it would amount to what Chomsky called a "demand for a theory of everything", a pitfall that Davidson and Fodor have warned against when discussing pragmatics (see Carston, 2002, pp. 1–2).

Other challenges await attempts to develop an inferential theory that can resolve the problem of underdeterminacy without ostension. I hope that this paper may lead its readers to take them up.

# 6. CONCLUSION

In this paper, I have presented cases of non-ostensive, spontaneous emotional expressions where the relevant codes underdetermine the meaning of what is communicated and where the prevailing inferential theories seem unable to fully account for the information that is communicated. I have then suggested that one could develop a version of the inferential model that can explain these cases. This would require an account whose scope extends not only beyond ostension, but beyond intentional behavior.

If all this is correct, it should have interesting consequences. One of them concerns the scope of pragmatics. As mentioned in §1, the scope of the inferential model is commonly thought to correspond to that of pragmatics (see e.g., Bach, 2004, Section 2.1; Carston, 2002, Chapter 1; Korta & Perry, 2020, Section 3; Schlenker, 2016, p. 664; Sperber & Wilson, 1986, Chapter 1). The scope of pragmatics may thus need to broaden by setting aside the idea that it only applies to intention-based communication (for arguments going in the same direction, see Bonard, 2022; Sperber, 2019; Wharton et al., 2021).

Another possible consequence concerns the affective sciences. In this domain, the code model is the orthodox approach to analyzing emotional expression and recognition – usually the version of Shannon (1948) or Brunswik (1956) (see e.g., Ekman, 1993; Juslin & Laukka,

2003; Scherer, 2003). If my argument in this paper is sound, another kind of model, perhaps some version of the inferential model, should be needed in this domain.

There could also be consequences in other fields where it is assumed that if communication cannot be accounted for by a code model, it would require postulating communicative intentions. As mentioned in the introduction, this assumption is present in the study of language evolution, developmental psychology, and primatology.

Although I only sketched it in §5, I believe that we can explain cases of underdeterminacy without ostension thanks to hypotheses similar to the ones provided by the prevailing versions of the inferential model. Alternatively, a new version of the code model may be devised to account for the kind of cases that I exposed. This would prove my argument in §3 to be incorrect, but we would have learned something in the process. This possibility should also have interesting consequences. Instead of extending the scope of pragmatics, that of what Schlenker (2022, pt. III)calls "super semantics" may be extended.

In any case, I hope to have succeeded in attracting the reader's attention to cases that are not straightforwardly accounted for by the prevailing versions of the code and inferential models of communication, that this may motivate some readers to find an explanation for it, and that this may contribute to the development of ameliorated models of communication, whether they are inferential, code-based, or of another kind.

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