"Get the shot, now!" Disentangling content-related and social cues in physician–patient communication

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Abstract

We investigated how recipients disentangle social and content-related cues in physicians' communication. We presented 53 students with four different statements by physicians concerning the measles-mumps-rubella vaccine. In a 2×2 within-subject design, we manipulated politeness and the use of technical terms. We expected politeness variations to mainly affect social perceptions, whereas terminology should mainly affect perceptions of the content. However, politeness did not affect most judgments, whereas terminology influenced more social perceptions than expected. We argue that these variations differentially affect perceptions of fulfillment of basic communion and agency needs. We derive possible implications for physician–patient communication and other contexts.

Keywords

communication, learning, quantitative methods, social cognitions, technical language

Introduction

Early communication theories have depicted communication as an exchange of information in which the main difficulty is handling interference and ensuring that the recipient will understand the intended meaning (e.g. Shannon and Weaver, 1949). In contrast, Watzlawick's influential account (Watzlawick et al., 1967) emphasized that communication is also influenced by the social relationship between the interactants: the content of communication can only be interpreted in light of the simultaneously transmitted relational information. This theory has also influenced health psychology research; much effort has been put into elucidating how the relationship between health care providers and their patients affects treatment outcomes and how it can be fostered (Blasi et al., 2001; Stewart, 1995).

Current theories of communication and language go even further and suggest that the relationships between the form and content of language interact in a more complex manner (Holtgraves, 2002). For example, the communicated content can convey social information by providing conspicuously too much or too little detail (Grice, 1975), and vice versa, social cues can influence the interpretation of the content (Bonnefon et al., 2011).

In the following, we will review research into social as well as content-related aspects of physician–patient communication. Although both have received attention in the field individually, their interrelations are less well researched. This applies especially to how patients perceive these kinds of cues in physicians' language in concrete interactions. To gain some insight into these phenomena, we will first present findings from related fields, including instructional communication. From that, we derive the rationale for an empirical study analyzing the relationship of social and content-related cues in the context of physician–patient communication.

Social and content-related aspects of physician–patient communication

Physician–patient communication has three major functions: information exchange, building a functioning relationship, and reaching shared decisions about treatment

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(Ong et al., 1995). These functions can be directly conducive to the ultimate goal of positive therapeutic outcomes, but their effects are usually mediated by intermediate outcomes such as patients' understanding of the conveyed information, rapport with and trust in the physician, and satisfaction with the interaction (Street et al., 2009). This shows that successful consideration and implementation of both the content-related and the social facets of communication are important.

Regarding social variations of communication, health care professionals differ in how empathically they respond to patients (Crawford et al., 2018), and patients differ in the relational expectations they bring to every encounter (O'Hair et al., 1996). Empathy on part of the physician can improve patient satisfaction and compliance by way of improved information exchange, but also because patients perceive empathic physicians as knowledgeable partners whom they can trust (Kim et al., 2004). Patients and practitioners alike identify rapport building as crucial in sensitive contexts, such as talking about stigmatized and severe illnesses (Aldaz et al., 2017; Hurley et al., 2018).

Regarding the effects of variations in the content-related aspects of communication, the quality of physicians' explanations has come under scrutiny: Physicians often overestimate how clear their communication is (Hagihara et al., 2006; Howard et al., 2013), and their use of jargon can cause anxiety and confusion (Chapple et al., 1997). When patients do perceive an explanation as sufficient, they are more satisfied with the encounter and are more likely to follow the physician's advice; a lack of understanding can lead patients to ignore the advice or even to change physicians (Hagihara and Tarumi, 2009). Similarly, physicians' skillful use of argumentation can increase patient understanding, trust, and shared decision-making (Karnieli-Miller and Neufeld-Kroszynski, 2018; Labrie and Schulz, 2015).

Thus, the literature shows that both social and content-related variations in physicians' communication impact health-relevant outcomes. A few of these investigations have also shown that the two aspects interrelate: Better explanations are related to higher perceptions of a physician's empathy or courtesy (Hagihara et al., 2006), and less empathic practitioners may have shorter interactions with their patients and thus convey less information (Crawford et al., 2018). However, systematic analyses of how these two aspects interrelate are scarce (but cf. Graham and Smith, 2016; Richmond et al., 2002).

In addition, their concrete linguistic realizations have seldom been analyzed experimentally, for example, by comparing specific variations in physicians' language. On the surface, the content of our communication seems to be conveyed by *what* is said—the actual concepts in the message and how they are connected—whereas social relations are negotiated by *how* it is said—whether the physician is being polite, looks the patient in the eye or at their feet, or what kind of prosody they use. However, although recent accounts of language use suggest that the two aspects interact in a more complex manner (Holtgraves, 2002), there is little insight into how this plays out in physician–patient interactions.

Research in the field of instructional communication has analyzed these interrelations more extensively (e.g. Brummernhenrich and Jucks, 2013; McCroskey et al., 2004), and findings from this field could provide valuable insights: as in instruction, explanation giving and information transfer are also central for physician–patient communication (Ong et al., 1995; Street et al., 2009). Thus, as in instructional communication, it is important that physicians tailor their communication so that patients can understand the diagnoses and recommendations (Chapple et al., 1997; Jucks et al., 2012). However, this is made more difficult when there is a knowledge gap between communication partners (Bromme et al., 2005), as is often the case in both instructional communication and physician–patient communication. As these communication contexts share many key features, research on how content-related and social aspects of communication interact in instructional contexts is also pertinent for the field of health communication.

In the following, we summarize this research and related findings, and we show that linguistic variations in content-related and social aspects of communication interact in such a way that predominantly social variations tend to influence how the content of a message is understood and vice versa, that the content of a message affects recipients' social perceptions of the communication partner.

Effects of social linguistic variations

One line of research has focused on *politeness* in instruction. Politeness is defined as a set of linguistic strategies that aim to redress face-threatening and thus potentially unpleasant utterances—such as corrections or requests—in a face-saving manner that recognizes the addressee's needs for autonomy (*negative politeness*) and belonging (*positive politeness*; Brown and Levinson, 1987).

Health care providers often employ these strategies when negotiating difficult situations: Physicians, for example, use indirectness, hedging, and sequential placement when telling patients to undress, and they use direct requests only very sparingly (Aronsson and Sätterlund-Larsson, 1987). Pharmacists express sympathy and solidarity with their clients, and use strategies that minimize impositions when talking about compliance or financial issues (Murad et al., 2017). Nurses decrease the gravity of a potential birth defect by talking about risks in relation to a group of people ("women at age thirty-eight") instead of the patient themselves (Zayts and Kang, 2009), although the specific realization of relational work may differ between cultures (Zayts and Schnurr, 2013). However, beyond these descriptive findings, little is known about the effects of politeness strategies in the context of health communication.

When physician–patient communication is conceptualized as instructional communication, findings from learning and teaching provide relevant insights: Competent facework is positively correlated to learning-related outcomes such as motivation and feedback effectiveness (Kerssen-Griep et al., 2003; Trees et al., 2009). We found in our own research that whether a message is phrased politely or bluntly mostly influences social perceptions of the sender, such as an instructor's likability or goodwill, but also perceptions of the message as appropriate. The degree of politeness did not, however, affect content-related impressions, such as subjective impressions of learning, perceived clarity of the instruction, or the instructor's competence (Brummernhenrich and Jucks, 2016; Jucks et al., 2016; Linnemann et al., 2014). In contrast, other research has found that polite communicators do appear more competent and trustworthy than neutral or rude ones (Jessmer and Anderson, 2001; Trad et al., 2014).

Politeness considerations could lead instructors to avoid strategies that they think are unpleasant for the learner, such as direct negative feedback, or content that they find too difficult (Bromme et al., 2012; Person et al., 1995). Despite these effects, findings on how politeness influences learning outcomes have been mixed (Brummernhenrich and Jucks, 2013; McLaren et al., 2011b). Studies that used written instructions found that polite instructions were more effective than explicit ones (McLaren et al., 2011a; Schneider et al., 2015). Polite messages might not be necessarily perceived as less clear than explicit ones (Brummernhenrich and Jucks, 2016).

This argument, that politeness could lead to ambiguous communication by rendering the intention of the speaker unclear, has also been made for more general contexts (Bonnefon et al., 2011; Holtgraves and Perdew, 2016). In the specific case of physician–patient communication, politeness can, for example, influence how the patient interprets uncertainty terms: If a physician tells their patient that "it is possible that your pain will *increase*," the term *possible* will be interpreted as more certain than if the statement is "it is possible that your pain will *decrease*" (Pighin and Bonnefon, 2011). Physicians may also be tempted to palliate unpleasant diagnoses and recommendations, thus jeopardizing clarity (Aronsson and Sätterlund-Larsson, 1987; Bromme et al., 2012). If a physician says "You might also have to adjust your diet," the patient might correctly attribute this polite phrasing to the physician's underlying social intention to make the recommendation less imposing; however, the patient could alternatively draw the more self-serving conclusion that they perhaps do not have to change their diet after all.

In contrast to politeness, a social variation that has yielded consistent positive effects on both social and content-related measures in instructional contexts is *immediacy* (e.g. Witt et al., 2004). Immediacy refers to behavior that aims to increase closeness between the interactants, including nonverbal behaviors such as seeking eye contact and moving closer to the learner. We are, however, unaware of any studies of immediacy in the context of physician–patient communication.

In summary, social variations in instructional communication clearly influence social judgments of the speaker and the message itself, whereas their influence on content-related judgments is less clear.

Effects of linguistic variations related to content

Experts can use very different kinds of languages to talk about their topics of expertise. Physicians typically try to use the same terms that their patients use and thus adapt to their patients' level of knowledge about the topic (Jucks et al., 2008, 2012). Such *lexical alignment* can facilitate communication by creating as well as signaling common ground (Brennan and Clark, 1996). However, it can also lead to miscommunication when the shared understanding is only imagined but not actual (Krauss and Fussell, 1991; Paus and Jucks, 2012).

Lexical alignment can be conceptualized as part of a more general phenomenon called communication accommodation (Giles et al., 1991). Accommodation is achieved, for example, by converging on similar lexical choices, nonverbal behaviors, or accents. Convergent accommodation has effects on several communication outcomes, both related to the content and social aspects of the interaction; a recent meta-analysis showed that communication accommodation most strongly and positively affects perceptions of credibility, quality of contact, the general evaluation of the communication partner, and relational solidarity. Perceived nonaccommodation has equivalent negative effects (Soliz and Giles, 2014).

In the context of physician–patient communication, one type of relevant, content-related alignment is the choice of *lexical encoding*. Many medical concepts, including diagnoses and recommendations, can be expressed in either specialized or everyday terms: Although medical journals often use the term *cerebrovascular syndrome*, patients will likely be more familiar with the term *stroke*. Using technical instead of ET for specialized medical concepts makes the content appear more difficult to comprehend (Jucks and Paus, 2012; Thon and Jucks, 2017). It will also identify the person using the terms as an expert in the field (Bromme et al., 2001). Inversely, using everyday language can engender a false feeling of knowing, giving the lay audience the subjective impression that a concept is familiar (Koriat and Levy-Sadot, 2001).

In summary, variations in how the content of the discourse is phrased can lead to differences in both understanding and social perception. Using the same language as a patient should lead to messages that are perceived as better understood and more appropriate. However, using technical language should clearly identify physicians as experts in their field, and thus engender perceptions of competence.

Hypotheses

As the literature shows, social variations in communication influence not only social perceptions, but also perceptions related to the content of the message. The same can be true for content-related variations. This study aims at disentangling these relationships.

We studied these phenomena in the context of communication between physicians and their patients, specifically vaccination messages. We applied social and content-related variations to physicians' statements: face threats were either phrased politely or explicitly (*politeness* manipulation), and medical terms were lexically encoded using either everyday terms (*ET*) or technical terms (*TT; terminology* manipulation).

We analyzed the effects of these variations on three levels: the perception of the sender (i.e. the physician), the perception of the statements they express, and the perception of the medical concepts contained in the statements. On the sender level, we expect the variations to affect the perceived trustworthiness, facework, and the perceived social relation to the physician; to affect the perceived comprehensibility, clarity, and appropriateness of the messages; and to affect the recipients' feeling of knowing regarding the concepts in the messages. These outcome variables have been researched in previous studies in instructional and health contexts, and they are also relevant for health communication.

Of these outcome variables, comprehensibility, clarity, and feeling of knowing are perceptions that are more closely related to the content of communication, whereas facework, social relation, and appropriateness are more related to social or relational perceptions. Trustworthiness is traditionally construed as consisting of the three dimensions: expertise, integrity, and goodwill (McCroskey and Teven, 1999; Mayer et al., 1995). Of these, expertise relates more closely to content, while integrity and goodwill relate more to social perceptions of the information source.

Following the literature review, we state the following hypotheses.

Sender level. Physicians who use TT will be perceived as more trustworthy than those who use ET, because the terminology manipulation will have an effect on perceived expertise (Hypothesis 1). There should be no difference between physicians using TT and ET concerning recipients' perceptions of physicians' use of facework and a positive social relation to the physician.

Physicians who phrase face threats politely will be perceived as employing more facework (H2a) and being more trustworthy (because the politeness manipulation will have an effect on goodwill and, arguably, expertise) than those that utter face threats explicitly (H2b). Participants should also indicate a more positive social relation to polite physicians (H2c).

Statement level. Statements that contain TT will be perceived as less clear (H3a) and comprehensible (H3b) and less appropriate (H3c) than those that contain ET.

Statements with politely redressed face threats will be perceived as less clear (H4a), but *more* appropriate (H4b) than statements with explicit face threats.

We expect no interaction between politeness and use of TT concerning the clarity of the statement; the effects should be additive. However, explicit statements (without polite redress) should be perceived as inappropriate, regardless of their use of TT; that is, there should be no difference between terminology conditions (ET or TT) for the explicit statements. Polite statements, on the other hand, should differ in appropriateness, depending on their terminology: polite statements using TT should be perceived as less appropriate than those using ET (H5).

Concept level. The recipients' feeling of knowing regarding the medical concepts used in physicians' statements will be stronger for ET than for TT (H6). We expect politeness to have no effect on the concept level.

Method

Study design

In order to test our hypotheses, we designed a study to compare recipients' perceptions of social and content-related aspects of physicians' communication, depending on the use of technical versus everyday language and polite versus explicit face threats. To this end, participants indicated their perceptions of four constructed statements that were specifically altered to realize different levels of the independent variables politeness and terminology. The experimental manipulation was realized in a 2×2 within-subjects design.

The physicians' messages were about measles and the combined measles-mumps-rubella (*MMR*) vaccination. We chose this topic because we wanted to use one with which our participants would be reasonably familiar, and MMR vaccination is part of the general vaccination recommendations in Germany (Robert Koch-Institut, 2018). In addition, the topic has received attention in the media, and education about measles and its vaccination is a current topic in health psychology and health communication research (e.g. Camerini et al., 2018; Harvey et al., 2015; Moyer-Gusé et al., 2018). We see MMR as representative of similar medical topics about which patients have some but limited knowledge (e.g. diabetes; Bromme et al., 2005; Schillinger et al., 2004), and we expect the results to generalize beyond this specific topic.

Our hypotheses predict effects on various content-related and social perceptions of the physicians' communication. Where possible, we operationalized these dependent variables using measures that have been used in previous research in order to better connect our study to this previous work. We describe these in detail under section "Measures."

Table 1. Explicit and polite phrasings of physicians' face threats.

Explicit	Polite
You absolutely have to take a prick test before getting the MMR vaccine.	It would be sensible for you to take a prick test before getting the MMR vaccine.
You are wrong, that is not measles.	One could think that this is measles, but in my opinion it is not.
Your concerns are unwarranted, this isn't real measles.	I don't think you're suffering from measles.
You should get vaccinated right away!	In your situation, it would probably be advisable to get vaccinated.

Materials and procedure

We constructed four statements by fictional physicians that addressed some aspect of measles and MMR vaccinations. Examples are shown in Appendix 1. The physicians' statements were then varied in their use of technical terminology and politeness. In German, many technical concepts can be expressed by either an ET or a TT, usually of classical Latin or Greek origin. An English example would be the term "exanthema" for the spots usually showing in the course of a measles infection or "retroauricular" which means "behind the ears" (where the spots usually begin showing). Other pairs of terms used were "mitigated"/"mild" and "confluent"/"flowing together." (Note that these are translations of the German originals.) Every statement contained three of these terms which were all presented either in ET or in TT. A similar method has been used in previous studies on the understanding of medical concepts (e.g. Bromme et al., 2005; Jucks and Paus, 2012; Thon and Jucks, 2017). The full materials are available online; links are provided in Appendix 2.

Every statement also contained a face threat. These were either presented in an explicit manner, such as "You should get vaccinated right away," or redressed with politeness strategies, such as "In your situation, it would probably be advisable to get vaccinated." The phrasings were constructed using strategies delineated in politeness theory (Brown and Levinson, 1987) and in a similar manner as in previous studies (e.g. Jucks et al., 2016; Trad et al., 2014). Translations of all four face threats in both explicit and polite wordings are shown in Table 1.

Four sets of questionnaires were constructed in such a manner that each of the four statements was realized with every combination of the independent variables of terminology and politeness. The experimental manipulation was thus realized within subjects, so that every participant read all four statements, each with one of all four possible combinations of terminology and politeness (i.e. ET polite, ET explicit, TT polite, and TT explicit). The order of the messages was the same for every participant, but the order of the factor level combinations was varied between the four sets.

Participants took part in the study in groups. Each individual participant in the group received their own paper questionnaire, a consent form, and a participant information sheet. The information sheet conveyed the topic of the research and asked the participant to judge the following messages using the scales provided. Four sheets containing the messages with the scales as well as a sheet with demographical questions followed. After the participants finished, they were thanked for their participation and dismissed.

Sample

We recruited two convenience samples: (1) high school students in their last or second-to-last year before their German *Abitur* (university entrance qualifications) who participated at an open house event that our university holds yearly for potential new students and (2) university students in their first year of bachelor's degree studies. We planned to recruit as many participants as possible, aiming for about 50. A power analysis for an expected small to medium effect ($d=0.4$) revealed that for a within-subjects analysis as we had planned, a sample size of 52 would lead to a statistical power of 80 percent.

In total, 53 persons participated in the study, where 25 were high school students and 28 were university students. The mean age of the high school students was 17.3 years ($SD=0.99$ years) and that of the university students was 21.46 years ($SD=2.39$ years). One participant did not provide demographic information. Of the remaining 52 participants, 12 were men and 40 were women. All were native German speakers. Our department's ethics review board approved the study.

Participants were asked to indicate their age, gender, and the subjects they majored in. We also asked whether the participants themselves were inoculated against measles, whether they experienced needle phobia, whether they had researched the topic before, and how they judged their knowledge about health topics generally (on a 5-point scale from "very bad" to "good").

Measures

Participants were asked to rate every statement, the physician who uttered it, and the technical concepts in it on both social and content-related measures. All measures were rated on 5-point Likert-type scales or, when the measure was a semantic differential, on 5-step bipolar scales.

Sender level. The physician who made each statement was rated regarding *facework, trustworthiness*, and perceived *social relation*.

The participants rated the physician's facework using the Revised Instructional Face-Support Scale (RIFS; Kerssen-Griep et al., 2008). The wording was adapted so that participants were asked to provide their perception of "the physician" (instead of "your instructor" in the original) concerning the use of positive and negative politeness, using four items each. Sample items are "The physician made sure not to cast me in a bad light" (positive politeness) and "The physician left me free to choose how to respond" (negative politeness). Because we were not interested in differences of positive and negative facework, we averaged all eight items for a composite facework score. The scale exhibited a satisfactory consistency with Cronbach's $\alpha = 0.88$.

The participants rated how much they trusted the physician as a source of knowledge using the Münster Epistemic Trustworthiness Inventory (Hendriks et al., 2015). This inventory consists of subscales measuring goodwill (four items, for example, "moral–immoral"), expertise (six items, for example, "qualified–unqualified"), and integrity (five items, for example, "honest–dishonest"). All subscales exhibited satisfactory consistencies with Cronbach's $\alpha = 0.84$, 0.92, and 0.86, respectively.

The participants indicated how much they agreed with the following statements: "I find the physician likable" and "I would consider consulting that physician." The two items were averaged to a measure of perceived social relation. Consistency was satisfactory with $\alpha = 0.92$.

Statement level. Participants were asked to give three assessments regarding the physicians' statements: "I found the statement *clear and unambiguous*," "I found the statement *comprehensible*," and "I found the statement *appropriate*."

Concept level. For each of the three manipulated terms (ET or TT) contained in every statement, the participants were asked to respond to the statements "I know the term" and "I understand the meaning of the term." The two items were combined into a measure of *feeling of knowing*. Consistency was satisfactory with $\alpha = 0.94$.

Results

The outcome variables were measured multiple times for each participant, and every statement contained three terms to be judged by the participants. For this reason the outcomes were analyzed with linear mixed effects models, using the lme4 package (Bates et al., 2015) for the R statistical software. For every outcome variable, we calculated a model containing the two independent variables (politeness

and terminology) as well as their interaction and all covariates (age, gender, vaccination status, self-reported prior knowledge, needle phobia, and sample) as fixed effects. Because participants responded to multiple statements, and every statement could realize any factor combination of the two independent variables, the participant id and the statements were entered as random effects. The hypothesis tests were performed using the lmerTest package (Kuznetsova et al., 2016). Links to the full data and analysis scripts are provided in Appendix 2.

Means and standard errors (SEs) for all conditions are reported in Table 2. These values are marginal means from the mixed effects models that are adjusted for the average value of the covariates.

Sender level

Facework. The analysis confirmed hypothesis H2a that polite physicians would be perceived as employing more facework than those who do not mitigate face threats, $F(1,204) = 24.60$, $p < 0.001$. However, the analysis also showed an unexpected effect for terminology: Physicians who used TT were perceived as employing less facework than those who used ET, $F(1,204) = 11.88$, $p < 0.001$. There were no significant interactions or covariates.

Trustworthiness. The analysis regarding *goodwill* did not show the effect of politeness that we expected according to hypothesis H2b, $F(1,153) = 2.87$, $p = 0.092$. It did show an effect for terminology: Physicians who used TT were perceived as showing less goodwill than those who used ET, $F(1,153) = 14.53$, $p < 0.001$. There were no significant interactions or covariates.

Contrary to hypotheses H1 and H2b, none of the independent variables significantly affected *expertise* judgments, neither terminology, $F(1,152) = 2.25$, $p = 0.136$, nor politeness, $F(1,152) = 0.54$, $p = 0.465$, nor their interaction or any covariate.

We did not expect any effects on the *integrity* subscale of the trustworthiness measure. However, the model did show an effect of terminology: physicians who used TT were judged as less honorable than those who used ET, $F(1,153) = 21.97$, $p < 0.001$. There was no effect for politeness, $F(1,153) = 1.85$, $p = 0.175$, the interaction term, or any of the covariates.

Social relation. We expected that participants would indicate a more positive social relationship with polite physicians than with explicit physicians (H2c). We found an effect in the expected direction, but it was only marginally significant, $F(1,204) = 3.61$, $p = 0.059$. However, we also found a significant effect for terminology: Participants judged their social relation with physicians using TT as worse than with those using ET, $F(1,204) = 22.56$, $p < 0.001$.

Table 2. Descriptive statistics (marginal means adjusted for covariates).

				Polite wording	Explicit wording	Total
				Mean (SE)	Mean (SE)	Mean (SE)
Sender level	Facework		TT	2.98 (0.22)	2.53 (0.22)	2.75 (0.21)
			ET	3.39 (0.22)	2.82 (0.22)	3.10 (0.21)
			Total	3.18 (0.21)	2.67 (0.21)	
	Trustworthiness	Goodwill	TT	3.22 (0.18)	3.01 (0.18)	3.11 (0.17)
			ET	3.59 (0.18)	3.44 (0.18)	3.51 (0.17)
			Total	3.40 (0.17)	3.22 (0.17)	
		Expertise	TT	3.92 (0.14)	3.76 (0.14)	3.84 (0.12)
			ET	4.00 (0.14)	4.01 (0.14)	4.00 (0.12)
			Total	3.96 (0.12)	3.88 (0.12)	
		Integrity	TT	3.28 (0.18)	3.18 (0.18)	3.23 (0.17)
			ET	3.77 (0.18)	3.60 (0.18)	3.68 (0.17)
			Total	3.52 (0.17)	3.39 (0.17)	
	Social relation		TT	2.93 (0.30)	2.63 (0.30)	2.78 (0.28)
			ET	3.55 (0.30)	3.33 (0.30)	3.44 (0.28)
			Total	3.24 (0.28)	2.98 (0.28)	
Statement level	Clarity		TT	3.14 (0.39)	2.99 (0.39)	3.06 (0.38)
			ET	3.89 (0.39)	4.39 (0.39)	4.14 (0.38)
			Total	3.51 (0.38)	3.69 (0.38)	
	Comprehensibility		TT	2.55 (0.46)	2.40 (0.46)	2.48 (0.45)
			ET	4.02 (0.46)	4.26 (0.46)	4.14 (0.45)
			Total	3.29 (0.45)	3.33 (0.45)	
	Appropriateness		TT	2.73 (0.37)	2.71 (0.37)	2.72 (0.35)
			ET	3.80 (0.37)	3.84 (0.37)	3.82 (0.35)
			Total	3.27 (0.35)	3.27 (0.35)	
Concept level	Feeling of knowing		TT	2.33 (0.32)	2.23 (0.32)	2.28 (0.32)
			ET	4.51 (0.32)	4.58 (0.32)	4.54 (0.32)
			Total	3.42 (0.32)	3.40 (0.32)	

TT: technical terms; ET: everyday terms; SE: standard error.

Statement level

Clarity. The analysis with clarity as the dependent variable showed the main effect for terminology that we had expected in hypothesis H3a, $F(1,152) = 55.06$, $p < 0.001$, but contrary to hypothesis H4a, none for politeness, $F(1,152) = 1.44$, $p = 0.232$. However, the analysis also yielded a significant interaction between terminology and politeness, $F(1,152) = 4.98$, $p = 0.027$. For terminology, the post hoc contrasts showed that statements with TT were perceived as significantly less clear than those with ET in both the polite condition, $t(152) = 3.67$, $p < 0.001$ and the explicit condition, $t(152) = 6.83$, $p < 0.001$. Regarding politeness, the contrasts revealed only one significant effect: Only statements with ET were perceived as less clear when the face threat was phrased politely compared to when it was explicit, $t(152) = -2.43$, $p = 0.016$. When the statement contained TT, politeness did not have an effect on clarity judgments, $t(152) = 0.73$, $p = 0.468$. The interaction effect is shown in Figure 1.

The age covariate also yielded a significant effect in this model, $F(1,51) = 4.70$, $p = 0.035$.

Comprehensibility. The analysis yielded the expected main effect for terminology (H3b): Statements with TT were judged as less comprehensible than those with ET, $F(1,151) = 174.64$, $p < 0.001$. We did not expect an effect for politeness and the analysis did not show one, $F(1,151) = 0.11$, $p = 0.736$. The age covariate showed a significant effect in this model, $F(1,51) = 4.76$, $p = 0.034$.

Appropriateness. The analysis showed the expected effect for terminology (H3c): Statements with TT were rated as significantly less appropriate than those with ET, $F(1,148) = 52.44$, $p < 0.001$. However, we did not find the hypothesized effect of politeness (H4b), $F(1,148) = 0.00$, $p = 0.973$ or the interaction put forth in hypothesis H5, $F(1,148) = 0.04$, $p = 0.850$. There were no significant covariates.

Concept level

Feeling of knowing. As predicted in hypothesis H6, participants indicated a much greater feeling of knowing for
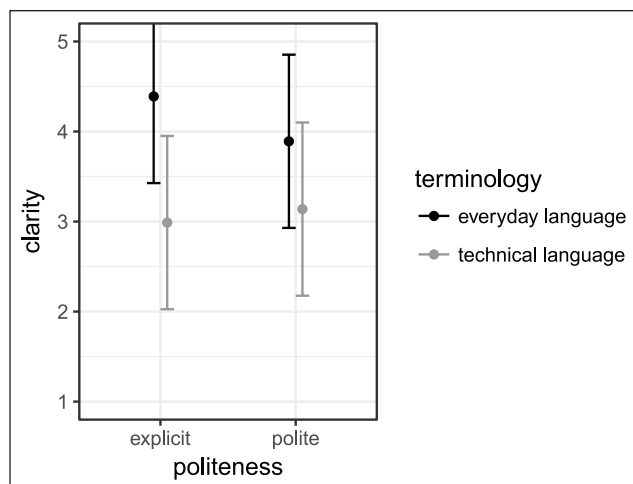
Figure 1. Means and standard errors of clarity ratings in the four conditions.

statements containing ET than those containing TT, $F(1,561) = 941.11$, $p < 0.001$. As expected, the politeness of the statement had no significant effect on feeling of knowing, $F(1,561) = 0.035$, $p = 0.852$, and there was no significant interaction between the two conditions. The participants' self-stated knowledge about health topics was a significant covariate in this analysis, $F(1,51) = 5.24$, $p = 0.026$.

Discussion

Summary of results

The results confirm some but not all of our hypotheses. The politeness variation in particular influenced participants' perceptions on fewer levels than expected. In line with our hypotheses, physicians who phrase their statements politely are judged as applying more facework, but we found no significant effects on perceptions of clarity, appropriateness, goodwill, expertise, or social relation.

On the other hand, the terminology variation, representing the lexical encoding of medical terms, affected participants' perceptions on many levels. We found most of the expected effects on content-related evaluations: TT resulted in a lower feeling of knowing than ET, and statements with technical language were perceived as less clear and comprehensible. However, technical language also unexpectedly led to lower perceptions of facework, goodwill, integrity, and a more negative score regarding social relation.

Finally, the results on clarity showed an unexpected interaction: Although all statements with TT were considered relatively less clear than those with ET, when ET were used, explicit statements were perceived as even clearer than polite ones.

In summary, the data show that, as expected, the content-related terminological variations impinge upon participants' understanding of the content. Further, politeness did positively influence some social perceptions, albeit on fewer dimensions than we expected and less than in previous research (Brummernhenrich and Jucks, 2016; Jucks et al., 2016; Linnemann et al., 2014).

However, the effects also unexpectedly "spilt over" across these broad categories: politeness arguably interacted with terminology to affect clarity judgments, and using very specialized TT clearly had negative effects on social judgments. In this case specifically, using highly technical language had negative effects on a broad range of perceptions.

Implications and directions for future research

These results are in line with the notion that social and content-related variations in physicians' language will affect perceptions not only in their respective domain (social or content), but also in the other. In this case specifically, using highly technical language had negative effects on a broad range of perceptions. How recipients disentangle these levels of communication seems not to be straightforward.

Our interpretation is that the different variations differentially influenced participants' more general perceptions of the interaction relating to aspects of *communion* and *agency*. Communion and agency are basic categories of social cognition, and their relevance varies depending on the specific social interaction (Fiske et al., 2007). They can also be construed as basic needs (Deci and Ryan, 2008; Horowitz et al., 2006) or aspects of the public image of a person (Goffman, 1967). The specific functional relationship between interlocutors could determine whether one of these needs is more salient and thus under threat in an interaction.

The current study's context of physician–patient communication differs from the instructional communication contexts of earlier research, in which politeness variations had shown clear effects on social perceptions. In formal education, for example, students usually have little control over what and how they learn. As such, agency needs cannot be fulfilled to a high degree, especially for weak learners, and communion needs might play a larger role. In physician–patient interactions, however, a perceiver might focus more on being competent and possessing actionable information.

In our study, the physician using TT thus threatens the patient's need for agency, because the physician's incomprehensible language forces the patient to ask about the confusing terms. In this case, the physician seems negligent in his or her choice of words and is hence perceived socially more negative. If, instead of a physician, it were a friend urging the recipient to get vaccinated, variations in

politeness might have a different effect, because communion might be the more salient dimension.

In this way it seems sensible that, in the specific case of the current study, the content-related variations of the physician's language were valid indicators of the physician's social disposition toward the patient, specifically their willingness to respect the patient's agency needs. Future research should test this assumption by analyzing how the same face-threatening messages are perceived when coming from speakers with different roles or relationships with the recipient. For example, such a study could compare the perception of statements made by the recipient's physician, a friend, and someone with whom the recipient is acquainted but who has another functional role not directly related to the problem, such as the recipient's dentist. In the case of the friend, communion should be more salient than agency for the matter at hand, so politeness should play a stronger role. A dentist, on the other hand, should be able to use technical language without being perceived as negligent, because providing actionable information regarding vaccinations is not their primary role. Thus, perceivers would not be expected to draw social conclusions from terminology variations in this case.

If such studies confirm the important role of communion and agency needs in physician–patient communication, the pertinent research from social psychology (see Abele and Wojciszke, 2019 for a current overview) will become relevant for the field, and further studies should test the applicability of its findings.

Practical implications

If, as our results suggest, language variations influence both social and content-related perceptions via basic social needs, experts have to be conscious about what needs are especially relevant to their clients. In many cases, patients' primary need will be getting actionable advice. Research on supportive communication has shown that attributes of both the message and its source influence perceptions of the message's quality as well as the recipient's intention of implementing the advice (Feng and MacGeorge, 2010). Regarding message factors, the main influencing attributes are perceived efficacy and feasibility, as well as politeness; the most important source attribute is perceived expertise. The results of our study show that very technical language did not lead to perceptions of expertise but did seem less polite. If this finding holds up, adapting technical language to a layperson's level of understanding might be important over and above ensuring successful information exchange (Bromme et al., 2005; Jucks et al., 2012).

The influences of the language variations examined in this study, and of basic needs more generally, should also apply to other contexts of health communication. Studies on language variations in vaccination appeals have, for instance, yielded inconclusive results (e.g. O'Keefe and Nan, 2012; Penţa and Băban, 2018). Focusing on how basic needs are addressed in these appeals could provide clues to why some messages are more effective than others. Appeals to vaccinate children (i.e. other-oriented appeals) might need a different approach than appeals for patients themselves to get vaccinated, because agency is processed preferentially in self-evaluations, while communion takes precedence in judging others (Abele and Wojciszke, 2007).

Limitations and issues

The conclusions of this research are of course only valid insofar as the results of the study can be trusted: the fact that politeness did not significantly affect most perceptions in this study contrasts earlier findings. Similarly, we found an effect on clarity that contradicts existing research. That polite language can cause ambiguity has been suggested numerous times and in different contexts (e.g. Aronsson and Sätterlund-Larsson, 1987; Bonnefon et al., 2011; Person et al., 1995), but we had not found this effect in our own research (Brummernhenrich and Jucks, 2013, 2016; Linnemann et al., 2014). The specific realization of politeness in this experiment could have been more ambiguous than in those previous studies.

The study employed a within-subjects design, which increased statistical power but might have made contrasts between the conditions especially salient. Replicating the results in a between-subjects design and using more extensive exchanges would lend them more credibility.

Finally, we chose MMR messages for the realization of the statements. We expect that our results generalize to other medical topics, especially because there was no indication that covariates that dealt with vaccination status or previous knowledge about MMR influenced the outcomes. However, we cannot be sure. Further research should try to replicate these findings using other types of messages.

Conclusion

We tried to disentangle how recipients judge *what* physicians say and *how* they say it—the content and the social connotations of their communication. To this end, we designed a study in which physicians' statements about vaccinations were varied regarding terminology and politeness. We expected that technical language would lead to higher judgments of competence, while politeness would lead to more positive evaluations on social perceptions such as facework and trustworthiness. However, based on previous research, we also expected overlap between these dimensions: polite statements should seem less clear and technical language less appropriate.

Within the content-related and social domains, respectively, our results showed mostly the expected results for terminology, but not for politeness. However, there was more overlap than expected, especially concerning the influence of

the content-related factor of terminology on social perceptions. We argue that this could be explained by how these variations impinge on the fulfillment of basic social needs in this context. Because humans are inherently social, these needs are so relevant that we may draw on very different aspects of language to make these judgments.

These assumptions would have strong implications for all fields of expert–layperson communication as well as related contexts such as advice-giving. Theoretical and empirical work needs to continue to differentiate the influence of language variations on social perceptions as well as patient learning and behavior and to clarify the role of basic needs.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Appendix 1

Sample statements (English translations)

You absolutely have to take a prick test before getting the MMR vaccine! Your egg allergy can be a contraindication because the attenuated virus strains in the live vaccine are grown in chicken embryos.

You are wrong, that is not measles. A measles rash is maculopapulous and confluent. It also typically begins retroauricularly, not in the armpit.

I don't think you're suffering from real measles. Your immune system is trying to deal with the vaccine. It's normal for symptoms to show in a mitigated manner.

In your situation, it would probably be advisable to get vaccinated. For people your age, measles infections are more severe than for children. You are at higher risk of developing laryngitis, an inner ear infection or even pneumonia. In the worst case, you could get encephalitis which has severe consequences.

Appendix 2

Sample statements (English translations)

All materials, data and analysis scripts available at https://osf.io/rqftj/