Laughables and laughter perception: Preliminary investigations

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Abstract

We present some preliminary studies aiming at investigating laughables (the entity or event that each laughter is related to) from different perspectives. In particular we explore whether different laughables can be accounted for in terms of Gricean maxim violations, whether naive coders can distinguish different kinds of laughables based on their semantics, whether laughs related to different laughables differ significantly in terms of arousal and valence judgements and whether such evaluations from naive coders correlate with their daily experience of laughter production and perception.

1 Introduction

Laughter is a crucial element in our daily interactions, and is frequent in adult dialogues regardless of gender and age (the dialogue portion of the British National Corpus (BNC) contains approximately one laughter token every 14 turns). It is produced in many different contexts and associated with very different emotional states and intentions (Poyatos, 1993; Glenn, 2003; Mazzocconi et al., 2016). In all of its uses, we argue, laughter has some propositional content that needs to be integrated with the linguistic input since it can enrich and affect the meaning conveyed by our utterances (Ginzburg et al., 2015). Following Ginzburg et al. (2015) and Mazzocconi et al. (ress), we consider laughter as involving a predication $P(l)$, where P is a predicate that relates to either incongruity or closeness (see section 2 for discussion) and l is the laughable, an event or state referred to by an utterance or exophorically (i.e. some non-linguistic material such as a strange movement or noise). As explored in detail in Tian et al. (2016), laughter can occur both before, during, or after the laughable. A clear example of laughter predication following the laughable is offered in extract (1) where the laughable is constituted by the denotation of the underlined utterance:

(1) *Example from a politics lecture (BNC, JSM)*
Lecturer: and so the Korean war started and the United Nations forces were commanded by one General Douglas MacArthur, General Douglas MacArthur, in case you don't know, won the second world war single handedly.
Students: **[laughter]**
Lecturer: **[laughter]** it's not funny, he believed it!

The students' laughter predicates incongruity and pleasantness of the preceding utterance: students laugh upon recognising the sarcastic tone of their professor stating that the General Douglas MacArthur won the second world war single-handedly, therefore recognising and enjoying the incongruity between what was said and what was meant, in addition to appreciating the incongruous pretence and impossible eventuality that a man could win a war alone. Moreover, the lecturer's rebuttal ('It's not funny') could not be justified without assigning the propositional content of something like "That laughable was pleasantly incongruous/funny!" to the laughter itself.

Understanding the role of laughter in our interactions involves several levels of analysis. In

the current work we will be mainly concerned with resolving its argument, the laughable, which needs to be distinguished from the *function* that the laughter is performing (see Mazzocconi et al., 2016 and Mazzocconi et al., ress).

Much research has focused on instances in which laughter refers to a humourous incongruity (e.g., Hempelmann and Attardo, 2011; Raskin, 1985), but this is not always the case. The types of predicates one can associate with laughter are quite a lot broader. An attempt to classify different kinds of arguments has been proposed in Mazzocconi et al. (ress), a summary of which is given in section 2. In section 3 we present some results obtained from a preliminary study on the classification of laughables and their relation to Gricean maxim violations. In section 4 we lay out methods and materials of a behavioural experiment which constitutes the main contribution of the present study. Section 5 presents the results of the behavioural experiment. We discuss the results and limitations of the present study in section 6 and present our conclusions in section 7.

2 Background

2.1 Categorising incongruity

Most scholars interested in the study of laughter would agree that most of its occurrences are related to the perception of an incongruity, i.e., an inconsistency between the expectations of the conversational participants and some event. This hypothesis has been studied extensively in theories of humour (Hempelmann and Attardo, 2011; Raskin, 1985), since it is easily applicable and able to account for laughter in response to humourous stimuli (e.g., jokes). However, although the notion of incongruity seems intuitive and offers an explanation for (some) causes of laughter, it cannot be consistently identified in all cases in which laughter occurs in dialogue. Moreover, the definitions of incongruity proposed have often been vague and of limited applicability for replication of annotation or computational models. It is therefore difficult to build a computational account of incongruity as it is currently conceived because incongruities can not only occur at all levels of linguistic interaction (phonology, semantics, pragmatics), but also can sometimes be identified in the para- or extra-linguistic context (non-verbal social signals or exophoric events). In order to offer a more fine-grained account, we aim to assess (i) which of the types of incongruity proposed in Mazzocconi et al. (ress) can be recognised by naive coders, and (ii) whether incongruity can be subdivided into categories that correspond to Grice's conversational maxims (Grice, 1975). We embrace a definition of incongruity as proposed in (Ginzburg et al., 2015), whereby this involves a clash between a general inference rule (a *topos*) and a localized inference (an *enthymeme*; see Breitholtz and Cooper, 2011), a view inspired by work in humour studies e.g., (Raskin, 1985; Hempelmann and Attardo, 2011). For more details see Ginzburg et al. (2015).

Following the account of Mazzocconi et al. (ress) we distinguish two major classes of laughter arguments: the ones in which an incongruity can be identified and the ones which do not involve incongruity. When incongruity is present, we distinguish three different categories: i) pleasant incongruity, ii) social incongruity, iii) pragmatic incongruity.

With the term *pleasant* incongruity we refer to any cases in which a clash between the laughable and certain background information is perceived as witty, rewarding and/or somehow pleasant (Goel and Dolan, 2001; Shibata and Zhong, 2001; Iwase et al., 2002; Moran et al., 2004). Common examples are jokes, puns, goofy behaviour and conversational humour, therefore closely connected with the definitions offered in humour research (e.g., Raskin, 1985). In (2), the students' laughter predicates the pleasant appraisal of the lecturers joke in which students are incongruously compared to delinquents (i.e. the laughable, underlined).

(2) *Pleasant incongruity, enjoyment of incongruity*

Lecturer: The other announcement erm is er Dr *** has asked me to address some delinquents, no that's not fair, some er hard working but misguided students...

Students: **[laughter]**

Lecturer: erm... (BNC, JSM)

We identify as a *social* incongruity all instances in which a clash between social norms and/or comfort and the laughable can be identified. Examples include moments of social discomfort (e.g. embarrassment or awkwardness), violations of social norms (e.g., invasion of anothers space, the asking of a favour), or utterances that

clash with the interlocutors expectations concerning one's behaviour (e.g., criticism) (Owren and Bachorowski, 2003; Caron, 2002; Fry Jr, 2013). In (3), the laughter is used to smooth the response to a compliment. Often, it is culturally frowned upon to speak well of oneself. Here the little laugh helps avoiding being viewed as presumptuous and arrogant, thereby helping to minimise potential social discomfort/incongruity. In this case, the laughter is used to predicate the incongruity of John's comment inducing the listener to appraise it positively.

(3) *Social incongruity, smoothing*
Interviewer: ...[cough] Right, you seem pretty well qualified.
John: I hope so **[laughter yes]** erm (BNC, JNV)

With the term *pragmatic* incongruity we classify incongruities that arise when there is a clash between what is said and what is intended. This kind of incongruity can be identified, for example, in the case of irony, scare-quoting, hyperbole etc. Typically in such cases, laughter is used by the speaker themselves in order to signal changes of meaning within their own utterance to the listener.

In (4) the Professor's laughter indicates that the upcoming statement is not to be taken seriously, but ironically. The laughter therefore predicates the presence of an incongruity in the laughable (i.e. history did not end with Ronald Reagan), inviting the listener to enrich his utterance.

(4) *Pragmatic incongruity, marking irony*
Lecturer: ...And then of course you've got Ronald Reagan...and **[laughter]** history ended with Ronald Reagan. (BNC, JSM)

However, as already mentioned, laughter can also predicate about laughables where no incongruity can be identified. In these cases what is associated with the laughable is a sense of *closeness* that is either felt or displayed towards the interlocutor, e.g., while thanking or receiving a pat on the shoulder. For example in (5), Richard's laughter predicates the appreciation of the laughable (underlined), i.e. the goodness received, showing closeness to his client.

(5) *Closeness, affiliation*
Richard: Right, thanks Fred. You're on holiday after today?
B: mh mh
Richard: Lovely. **[laughter]** (BNC, KDP)

2.2 Gricean Maxims in laughables

There is extensive literature accounting for laughter and humour occurrences in terms of violation of Gricean maxims (e.g., Attardo, 1990, 1993; Yus, 2003; Kotthoff, 2006). These have been defined by Grice (1975) as part of the cooperative principle of conversation which directs the interpretation of utterances in dialogue and are listed below.

1. **Maxim of Quantity** 'Be exactly as informative as is required', see example (2).

2. **Maxim of Quality** 'Try to make your contribution one that is true', see example (4).

3. **Maxim of Relevance** 'Be relevant', e.g. 'TEACHER: You've failed history again! PUPIL: Well you always told me to let bygones be bygones!' (Soedjarmo et al., 2016)

4. **Maxim of Manner** 'Be perspicuous', e.g. ambiguous anaphoric antecedent in 'Charles only makes love with his wife twice a week. So does Paul.' (Eco, 1984).

2.3 Perceptual features

In most previously published studies on laughter, participants were asked to judge arousal, valence and genuineness of laughs presented in isolation. Often the set of stimuli was constituted of laughs spontaneously produced whilst watching a funny video clip in comparison to voluntary produced laughs (Lavan et al., 2016), or actors laughing with the aim of conveying different emotions (Szameitat et al., 2009), or of laughs collected during a laughter elicitation procedure such as tickling (Hudenko et al., 2009). However, little attention has been paid to arousal and valence of laughs occurring in natural conversations.

2.4 Laughter functions

In our analysis, it is important to distinguish between the laughable (the laughter predicate's argument) and the function this predication serves in the dialogical interaction (Mazzocconi et al., 2016, ress). A laughter predicating a pragmatic incongruity can, for example, have the function of marking irony, scare quoting, inviting enrichment, editing phrase, seriousness cancellation and marking hyperbole. Each of those functions interacts differently with the linguistically generated

content and affect the meaning conveyed in different ways. All the laughter functions presented in Mazzocconi et al. (2016) and Mazzocconi et al. (ress) are dependent on the laughable classification in pleasant incongruity, social incongruity, pragmatic incongruity or closeness. Importantly, this classification does not exclude the fact that all laughs have intrinsically important social effects, being crucial for bonding, managing relationships and conversation and being extremely influenced by social context (Fridlund, 2014; Devereux and Ginsburg, 2001; Provine and Fischer, 1989).

3 Annotation for causes of laughter: a preliminary investigation

For our preliminary study, we randomly selected one full dialogue from The Switchboard Dialog Act Corpus (SWDA, telephone conversation discussing a given topic) (Jurafsky et al., 1997), 5 excerpts from other conversations in SWDA (provided with a brief context) and 5 from part of the British National Corpus (BNC, face-to-face dialogues in different settings), previously analysed for laughter (Mazzocconi et al., ress). All the selected conversations have been presented to annotators in textual form.

Our questionnaire contained: a) four questions related to general understanding of the given excerpt and the positioning of the laughter and laughable, b) four questions reflecting violations of Gricean maxims, c) one question reflecting the presence of incongruity, and d) two free-form questions about the cause of laughter and its function.

The results that we report here are from a pilot study with 3 annotators.[1] The full report on the preliminary study was presented in Maraev and Howes (2019). While there is not enough data to calculate inter-annotator agreement, with respect to questions (b and c), given that results are very sparse due to rare 'Yes' replies, the free-form answers to the question about the cause of laughter suggest that, at least in some cases, coders do understand and agree on the cause of the laughter. Nevertheless, we observed that in some excerpts it can be hard to describe the cause and function of laughter, even when the laughter is clearly understood. Example (6) shows disagreement between the coders regarding the position of the laughable (whether it occurred before or after the laughter); the cause of the laughter (e.g. "Saying something sad about another person" vs "Being depressed of other peoples' problems, and at the same time bringing them their problems"); and its function ("Softening" vs "Marking incongruity").

(6) A: We have a boy living with us who works for a credit card, uh, company that,
A: and he makes calls to people who have problems, you know, credit problems,
B: Huh-uh.
A: that are trying to work out
A: and, uh, **[laughter]**. Poor thing he comes home very depressed every night [laughter]
B: Oh. (SWDA, sw2883, 451–481)

Preliminary experiments have also shown that the prosodic contour of the linguistic context and the phonetic form of laughter are crucial in identifying its causes and functions. Those factors will be therefore crucially integrated in our further studies. Although we did not conclude that Gricean maxims have enough explanatory power to reason about the laughables, they may be helpful in indicating incongruity on a shallow level.

4 Behavioural study

4.1 Participants

Eleven native speakers of Mandarin Chinese (six females and five males) took part in this experiment. The mean age of the participants was 23.91 years (SD = 2.9 years, range 21-32 years old). All of the participants were attending universities in England. They were compensated a minimum of 15 pounds for their participation (which lasted around 1.5 hours). This study was approved by the UCL Research Ethics Committee (Project ID Number: ICN-PWB-13-12-13a), and written informed consent was obtained from all participants.

4.2 Materials

4.2.1 Video clips

The video clips were extracted from the video recording of the Mandarin Chinese section of the "Disfluency, exclamations and laughter in dialogue" (DUEL) corpus (Hough et al., 2016). The corpus consisted of 10 dyads of face-to-face and task-directed dialogue in Mandarin Chinese, French and German. Each dyad was given two

[1] The annotators were not native English speakers and they have given each excerpt a score to indicate how well they understand it. Nevertheless, some examples in the BNC were not produced by native speakers either. We are planning to involve native speakers in further studies.

open tasks ("design a dream apartment" and "create a short film script which contains embarrassing elements for the main character") and a role-play interview task where one participant played the role of an officer and the other played the role of a traveller who had a personal history and situation that disfavoured him/her in the interview. For the current study we worked exclusively with data extracted from 2 dyads from the Mandarin Chinese section of the corpus (dyad A and B).

For each laughter produced in the conversation, a short video clip was extracted that included enough contextual information to understand the argument of the laughter and its pragmatic function. The start and ending times and the position of the laughter were marked manually using Praat (Boersma et al., 2002). 64 video clips were extracted from the conversations in dyad A and 62 video clips were extracted from the conversations in dyad B. Each instance of laughter in the video-clips was classified by two Chinese expert annotators as referring to either a social incongruity or pleasant incongruity. However, both annotators had watched the whole video recording. To avoid any bias due to background information, six Chinese volunteers were invited to watch the video-clips (where expert annotators had obtained unanimous agreement) and to classify the laughter. After watching each video-clip, the volunteers were asked "Why do you think the laughter was produced?" with six options to choose from:

1. Because the laughter showed experience of embarrassment

2. Because the laugher was afraid to seem impolite (accompanying criticism, difference of opinion to their partner)

3. Because something very sad or bad was being said — to reduce the strength and the degree of unpleasantness

4. Because the laugher was trying to induce agreement and friendliness in their partner (e.g. accompanying a suggestion, asking a favour, apology)

5. Because something funny was said/had happened

6. I cannot choose because I need more background information

These items were constructed in order to be a simplified description of the most common arguments for laughter (Mazzocconi et al., 2016, Mazzocconi et al., ress). The first four options represent instances in which laughter predicates about a social incongruity and the fifth pleasant incongruity. The sixth option was added in order to understand whether the contextual information provided was sufficient for laughter interpretation.

Initially, 40 examples of laughter referring to a social incongruity (20 produced by dyad A and 20 produced by dyad B) and 40 referring to a pleasant incongruity (20 produced by dyad A and 20 produced by dyad B) were selected based on the unanimous classification of the two Chinese expert annotators and six naive annotators. The video clips with a higher percentage of agreement (at least 4 naive coders) in the classification were included in the stimuli set. However, given that the same stimuli were going to be used for a fNIRS data collection, we were forced to reduce the duration of the experiment. Therefore, the stimuli set was reduced to 40 video clips (20 containing a social incongruity and 20 containing a pleasant incongruity) exclusively from dyad B, where the subjects were unfamiliar with each other. The mean length of the video clips with laughter was 12.09 seconds with a standard deviation of 3.45s. The laughter occurred on average 6.4 (SD=3.2) seconds after the beginning of the video clip.

4.2.2 Laughter questionnaire

Participants were also asked to fill the Chinese version (Jin, 2018) of the questionnaire on people's experiences of their own laughter production and perception (Müller, 2017) (see Appendix A).

4.3 Behavioural study procedure

The 40 video clips with laughter were presented individually using the MatLab Psychtoolbox (Brainard and Vision, 1997). After watching each video-clip, the participants were asked to classify the laughter, rate the degree of valence on a Likert-scale of 1 to 7, from negative to positive, where 4 was neutral, and then rate the degree of arousal from 1 to 7. Participants were asked to classify the laughable choosing between the two most frequent types (Mazzocconi et al., 2016, Mazzocconi et al., ress): pleasant incongruity and social incongruity. As the aim of the study was to investigate how people totally naive to the framework would behave, we 'translated' these two cat-

egories into the simpler options: "What were they laughing about?" A1: A moment of social discomfort; A2: Something funny. All the questions were written in Chinese and the participants were given 5 seconds to answer each question. In addition, as a catch question, after every five video clips, the participants would be asked which subject in the video produced the laughter, the "Male" or "Female". For a graphic illustration of a trial see Appendix B. Before starting the actual data collection, participants were given the instruction sheet for the behavioural study and introduced to the classification and rating tasks. To ensure that they understood the task correctly, test trials with six video-clips, excluded from the stimuli set, were conducted. Lastly, to investigate whether participants' ratings were influenced by their perception, experience and production of laughter in everyday life, participants were asked to complete the laughter questionnaire (Jin, 2018) one week after the study. This was to decrease the influence of the video clips on their responses to the questions.

5 Results

5.1 Classifications of laughables

The classifications of laughter were coded into categorical variables (1=referring to a pleasant incongruity; 2=referring to a social incongruity). When the participants' classifications were compared with the unanimous classification of the two expert annotators (based on Mazzocconi et al., ress), the overall mean percentage of matching was 47.04% ($SD = 6.3\%$): 48.18% ($SD = 11.89\%$) for laughter related to social incongruity and 45.91% ($SD = 12.00\%$) for laughter related to pleasant incongruity. The average pairwise percentage agreement between the participants was 70.45%, which defines the amount of agreement on the classification of laughter in the video-clip, as the proportion of agreeing judgement pairs out of the total number for the classification (Artstein and Poesio, 2008). The statistical measure of the extent of agreement among coders–Krippendorff's α–was 0.43. However, when the experts' unanimous classification was added, the average pairwise percentage agreement decreased to 66.51% and the Krippendorff's α to 0.33.

5.2 Valence and arousal ratings of laughter predicating about pleasant and social incongruity

We used a Cumulative Link Mixed Model to compare ratings of valence and arousal between laughter related to pleasant or social incongruity using the *clmm2* function of the (*ordinal*) library in R. Firstly, the ratings were compared between the two classes as defined by the experimenters. The results indicated that there was no significant difference ($e = 0.28, se = 0.17, z = 1.66, p = 0.09$) for the mean ratings of valence between laughter related to pleasant ($M = 4.18$) and social ($M = 4.42$) incongruity. Similarly, there was no significant difference ($e = 0.09, se = 0.17, z = 0.57, p = 0.57$) for the mean ratings of arousal between the laughter related to pleasant ($M = 4.03$) and social ($M = 3.92$) incongruity. Then, we reran the analysis according to the participants' laughable categorisation. The results indicated that the mean rating of laughter valence when the laughable was classified as a pleasant incongruity ($M = 5.07$) was significantly higher than when it was classified as a social incongruity ($M = 3.56$; $e = 2.34, se = 0.2, z = 11.31, p < 0.001$). The mean rating of laughter arousal when related to a pleasant incongruity ($M = 4.57$) was also significantly higher than that predicating of social incongruity ($M = 3.40; e = 1.41, se = 0.18, z = 7.81, p < 0.001$). This suggests that even if they are not aware of it, participants may use perception of valence and arousal of the laughter in order to categorise the type of laughable the laughter is related to, rather than features of the laughable itself (see discussion in section 6).

5.3 Individual differences

Results from the 'Questionnaire on Peoples Experiences of Their Own Laughter Production and Perception' (Müller, 2017; Jin, 2018) were analysed and scores for the four components ('I like laughter', 'I do not understand others laughter', 'I laugh little' and 'I use laughter as a social tool') extracted (Jin, 2018). The factors were computed as follows: the ratings of items which were positively correlated with the factor were added together, while the ratings of items which were negatively correlated with the factor were subtracted. The total value was then divided by the number of items. See Table 1 to see which questions loaded on each factor.

In order to investigate whether people's experience, both in perception and production of laughter in everyday life would influence their valence/arousal ratings of laughter, non-parametric (Spearman) correlations were conducted between mean valence/arousal ratings for laughter related to social and pleasant incongruity and the four components. Despite the fact that results of our correlations have to be treated with caution because of the small sample size, compared to that commonly advised for analysis of correlation (n=25, David (1938)), we decided to report our results. We think it is good practice to accompany experiments about laughter perception with some measures of laughter perception in daily life that could account for individual differences. We know that laughter perception (especially in terms of valence and arousal) can vary across the population, and importantly, be affected by the presence of gelotophobic traits, i.e., fear of being laughed at (Chan et al., 2016; Papousek et al., 2009; Hofmann et al., 2015).

We found a significant negative correlation between the mean arousal rating of social laughter and the factor 'I like laughter': the participants who perceived themselves as liking laughter more in daily life generally rated laughter related to social incongruity as lower arousal. Although a significant positive correlation ($r(11) = 0.61, p = 0.04$) was found between the mean arousal and valence rating of social laughter, there was no significant correlation between the mean valence rating of social laughter and 'I like laughter'. No correlations between perceptual features and individual laughter experiences (questionnaire factors) were found for laughter related to pleasant incongruity.

6 Discussion

The aim of the current paper was to investigate whether participants, when asked to pay attention to the argument of the laughter rather than the laughter itself, could classify laughables and whether that classification would be influenced by their experience in perception and production of laughter in everyday life.

The first decision participants were asked to make was whether the laughter was related to a pleasant or a social incongruity. Participants' classifications met experts' classification (following Mazzocconi et al.'s (ress) framework) only by chance, and in this respect there was no significant difference between social and pleasant incongruity. Meanwhile, agreement on the classification of laughter between the participants themselves was much higher (70.45% overall average pairwise agreement). Both the percentage of agreement and the Krippendorff's α dropped when experts' classifications were included. In Mazzocconi et al. (ress) a much higher percentage of agreement and Krippendorff's α are reported between experts and naive coders following a brief training on the laughter coding framework.

The results suggest that without an explicit presentation of the framework for laughter analysis adopted (differentiating different layers of laughter analysis), other factors prevail on the classification of the laughable type. Some participants informally reported that they had classified as social incongruity cases where the laughter was produced in response to a humorous remark which they did not find very funny. This indicates confusing *the argument* (which was a humorous comment, therefore containing a pleasant incongruity) and the fact that the laughter was produced possibly with *the intention* of pleasing the interlocutor (which relates to the social function of laughter). While we do not deny the social effect and motivation that influence laughter production, we believe that it is important to distinguish this from the argument the laughter relates to.

6.1 Perceptual features

There were significant differences in the ratings of arousal and valence between laughter referring to a pleasant and social incongruity according to the participants' own classifications. However, no such difference was found according to the experts' classifications. We believe that the fact of observing significant differences in arousal and valence between the two classes only when comparing answers according to the participants' classification might be an indicator of the fact that the laughable classification was affected by perceptual features of the laughter (authenticity and spontaneity) rather than the features of the laughable itself. Mazzocconi et al. (ress) present an extensive discussion about the limitations of classifying laughter according to spontaneity and insincerity in natural conversation if the goal is to characterise the semantic and pragmatic use of laughter in dialogue. Laughter perceptual features may be more salient than the argument itself and could

Table 1: Numeric expressions of the four factors

Factor	Numeric Expression
1 ("I like laughter")	$(Q_{19} + Q_{16} + Q_{20} + Q_{18} + Q_{11} + Q_{21} + Q_8 - Q_3)/8$
2 ("I do not understand others laughter")	$(Q_{23} + Q_{24} + Q_{22} + Q_{28} + Q_{26} - Q_{17} - Q_{30})/7$
3 ("I laugh a little")	$(Q_6 + Q_5 + Q_2 + Q_9 + Q_1 + Q_4 - Q_7 - Q_{10})/8$
4 ("I use laughter as a social tool")	$(Q_{25} + Q_{15} + Q_{29} + Q_{14} + Q_{27} + Q_{13} + Q_{12})/7$

have influenced the laughable categorisations into pleasant and social incongruities. The patterns observed in the participants classification and ratings are indeed similar to the ones found in the literature when comparing volitional and spontaneous laughter (e.g. Lavan et al., 2016).

6.2 Individual differences on laughter perception

We analysed the correlation between the arousal and valence rating and the answers to the questionnaire on individual laughter experiences. The only significant correlation found was between the mean arousal rating of social laughter and the factor 'I like laughter'. This suggests that the participants who perceived themselves as liking laughter more in daily life generally rated laughter related to social incongruity as lower arousal. Although a significant positive correlation was found between the mean arousal rating of social laughter and the mean valence rating of social laughter, there was no significant correlation between the mean valence rating of social laughter and "I like laughter". On the contrary, no correlations between perceptual features and individual laughter experiences (questionnaire factors) were found for laughter related to pleasant incongruity. However, it is important to note that there were only 11 participants included in the behavioural experiment and the respective questionnaire analysis while the suggested minimum sample size for correlational analyses is 25 (David, 1938). Therefore, a larger sample size is necessary to investigate individual differences in ratings of arousal and valence.

7 Conclusion

The results from our preliminary investigation asking naive coders to classify laughables without any knowledge about our semantic framework where the form of the laughter, the laughable and the function are clearly distinguished, and give interesting insights about laughter perception. Not surprisingly, participants' laughable classifications did not show high percentage of agreement with the experts'. When arousal and valence ratings are compared according to the experts' classification no significant differences are observed between the laughs related to a pleasant incongruity and social incongruity, while when the comparison is run according to the participants' own classification significant differences emerge both with regards to arousal and valence. The results suggest that without an explicit presentation of the framework for laughter analysis adopted (differentiating distinct layers pertinent to laughter analysis), other factors prevail on the laughable classification. We attribute the disagreement on the laughable classification to two main factors: confusion between levels of laughter analysis and a reliance on the perceptual features of the laughter (authenticity and spontaneity), rather than on the features of the laughable itself. Moreover, it is interesting to note that the patterns observed in the participants' ratings of valence and arousal according to their own laughable classification are similar to the ones found in the literature when comparing volitional and spontaneous laughter (e.g., Lavan et al., 2016; Bekinschtein et al., 2011). This means that if a low arousal and quite posed laughter is produced in response to a joke, participants are more likely to classify it as a laughter predicating about a social incongruity rather than predicating of a pleasant incongruity; while in the framework applied by the authors, regardless of the spontaneity, valence and arousal, the argument would still be classified as a pleasant incongruity.

However, we do not think that our results should be taken as discrediting the classification. The authors' classification aims to model laughter use from a semantic perspective, while this might not be the priority in social interaction. Or rather it might be that resolving the laughable is so easy for expert communicators, that they can focus directly on the perceptual features of the laughter and evaluate its sincerity. Our results have nevertheless to be considered preliminary because of

the small sample size; we aim to extend our results to a broader population and to different cultures.

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A Laughter questionnaire

	Item
1	I rarely laugh when I am on my own.
2	I have a subdued laugh.
3	Hearing laughter makes me nervous.
4	I dislike people who laugh a lot.
5	I find things funny but I rarely laugh out loud.
6	I laugh less often than most people I know.
7	I laugh more than most people I know.
8	When I'm upset hearing someone laugh makes me feel better.
9	I rarely break into uncontrollable laughter.
10	If I find something funny, I often laugh out loud.
11	If I am happy, hearing someone laugh makes me even happier.
12	I often laugh deliberately to show that I like someone.
13	Hearing people faking laughter irritates me.
14	I can tell when people are laughing because they want something from me.
15	T can tell when someone is laughing to stop me getting angry at them.
16	I enjoy the sound of people laughing.
17	I can tell when someone is deliberately laughing to pretend that they are amused.
18	A friend's laughter is always good to hear.
19	Laughter has a positive influence on interactions with people.
20	I find laughter an important pan of intimate relationships.
21	I laugh more when I want people to like me.
22	I can never tell if someone is deliberately laughing to pretend that they are amused.
23	I can never tell if someone is laughing because they want something from me.
24	I can never tell if someone is laughing to stop me getting angry with them.
25	Sometimes I laugh to stop other people from getting angry with me.
26	Sometimes I find it difficult to tell when someone is laughing nastily.
27	I sometimes laugh to avoid expressing sadness.
28	Sometimes I find it difficult to tell when someone is laughing just to be polite.
29	I often laugh to avoid expressing frustration.
30	I can always tell if someone is laughing at or with me.

Table 2: Questionnaire on peoples experiences of their own laughter production and perception

B Behaviour study procedure

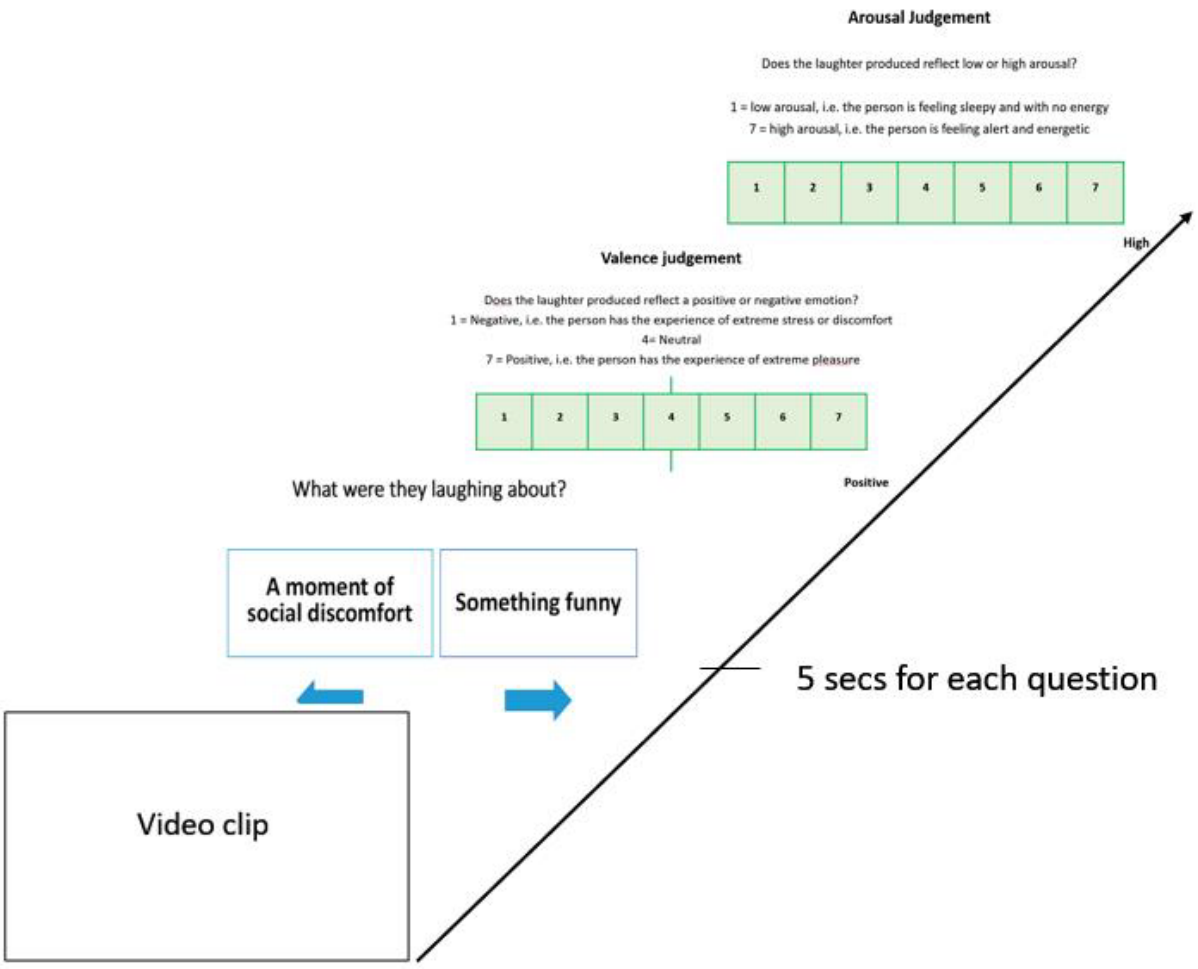

Figure 1: An example of the trial behavioural study (translated from Chinese)