You can laugh at everything, but not with everyone

What jokes can tell us about group affiliations

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This paper explores the impact of group affiliation with respect to the on-line processing and appreciation of jokes, using facial electromyography (EMG) activity and offline evaluations as dependent measures. Two experiments were conducted in which group affiliation varied between the participant and each of two independent (recorded confederate) speakers whose described political profiles were distinguished through one word: "Right" versus "Left." Experiment 1 showed that jokes were more highly evaluated and that associated EMG activity was more intense when it was later determined that the speaker was a member of the listener's ingroup rather than outgroup. In an effort to determine whether these *parochial* effects can be isolated to ingroup favoritism as opposed to outgroup derogation, Experiment 2 paired a joke-teller described as politically active (either from the right or the left) with one who was described as politically neutral. These more subtle comparisons suggest that the parochial effects observed in our joke understanding paradigm are mediated, at least in part, by the presence of an outgroup member.

Keywords: humor, language processing, parochialism, social laughter

1. Introduction

The way Darwin (1872, page 84) described laughter – as a means for "a joyful meeting between the attached members of the same social community" – still resonates with modern evolutionary accounts. According to Gervais and Wilson

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(2005) laughter "can promote the integration of new individuals into an already-present group structure" and Dunbar's Vocal Grooming Theory (2012) proposes that laughter and then language appeared as a tool for social maintenance. The link between laughter and affiliation is further supported by reported physical benefits to social laughing, such as surges in endorphin levels (Dunbar et al., 2012) and an increase in altruism (Curry and Dunbar, 2013).

While enlightening and highly reasonable, this social-promotion-and-maintenance view does not specifically consider those who are excluded from the laughter. This oversight is not trivial because people are often excluded intentionally in joking situations. Such exclusions are consistent with the following facts about jokes: a) there is very often a target in jokes (Attardo, 1993), b) jokes link dominance with stereotypes about outgroups (see Hodson et al., 2010) and; c) disparaging humor is more successful when it is directed toward outgroups (Abrams and Bippus, 2011). Taken together, there is a "dark side" to humor (Panskepp, 2000) that does not quite fit with Darwin's and others' benevolent vision of it. Moreover, by considering the unpleasant social aspects of humor and laughter, one can also raise doubts about the laughter's presumed role in solely *generating* positive affiliative effects. After all, the darker data can be taken to mean that affiliative effects are even the *result* of leaving people out.

Given this brief outline, it is of obvious value to determine the role that affiliation plays in laughter generation through, for example, jokes. While several studies (to be reviewed in greater detail below) make it increasingly clear that outcomes linked to laughter are not uniform across all group members (Dezecache and Dunbar, 2012) and that affiliation has a role to play in laughter (Platow et al., 2005; Hodson et al., 2010), it is unknown whether participants as addressees react differently to ingroup as opposed to outgroup joke-tellers. Moreover, regardless of concerns about affiliation, no experiment has actually investigated a listener's online processing as she actually generates laughter. The work presented here creates a single laughter-fomenting paradigm in which verbal jokes are told by two different people – one who can be considered an ingroup member and another an outgroup member – as we gather subtle reaction time (electromyographic) data as well as listener-determined judgments about joke quality. More specifically, we explore how an induced ingroup or outgroup relation between a speaker and participant can affect the appreciation of jokes. The online measures can help determine whether there are differences in uptake as a function of affiliation and, if there are, how these differences can be characterized.

1.1 Parochialism and language

Parochialism refers to the tendency to be altruistic towards a group to which one belongs combined with the tendency to be inconsiderate, or even hostile, toward groups to which one does not belong (Schwartz-Shea and Simmons, 1991; Baron, 2012). This is not an abstract description because experimental research lends support to the view that behavior varies as a function of a participant's perceived group membership. Prominent examples were initially developed through minimal group research (Tajfel et al., 1971, Billig and Tajfel, 1973), which has shown how spontaneously-formed membership categories (as ephemeral as shirt color) can suffice to produce favorable attitudes towards ingroups and unfavorable ones towards outgroups.

As far as language is concerned, research shows how parochialism contributes to the transmission and persistence of social stereotypes. For example, when reporting on a negative action committed by an outgroup member, a speaker is more likely to use a generalizable adjective such as "mean" or "aggressive" rather than a concrete description of the action itself; when the same action is committed by an ingroup member, a speaker is more likely to describe it concretely (Maass et al., 1989; see Maass, 1999, for a review of the Linguistic Intergroup Bias). Social categorization thus affects the way we communicate meaning and in a manner that promotes ingroup favoritism and outgroup derogation.

Any proposal concerning affiliations expressed through language must be attributed to the pragmatics of the utterance and more specifically to shared common ground. Psycholinguistic work underlines how readily interlocutors can team up, in essence, to create an intimate connection through their words in conversational exchanges. One well-known example concerns the way interlocutors attribute names to objects and maintain them for the length of a conversation through implicit conventions known as *conceptual pacts* (Brennan and Clark, 1996). This shows that the establishment of a common vocabulary is paramount in exchanges. The current work can be viewed as an extension of this literature in that it aims to determine how gradations of common ground can impact on pragmatically generated effects.

1.2 The case of jokes: Laughter as a dependent variable

Jokes make for a relevant case study concerning the affiliative effects of language because, as far as pragmatics goes, they have two attractive features. The first is that common ground is central to appreciating a joke (see Flamson and Barrett, 2008; Curry and Dunbar, 2013) and one would expect it to shift as a function of the speaker's affiliation with the listener. If one makes a joke about mothers-in-law, it

requires a shared perspective on, or common expectations about, the relationship between a mother and her child's spouse. When common ground is more likely to be presumed, a joke is arguably more likely to succeed. Second, understanding an interlocutor is the process of the listener gaining access to the speaker's communicative intention (Grice, 1989; Sperber and Wilson, 1986), which relies on – and helps decipher – the linguistically encoded message. Punch lines, the linguistic source of inference-making to be used here, ought to call on similar inference-making for all participants, but the affiliation of the speaker may affect the listener's speed or appeal to such inference-making.[1] It is thus conceivable that a listener will be less engaged and thus less likely to access an outgroup speaker's communicative intention than an ingroup speaker's. In other words, a joke told by an outgroup member could appear less funny simply because the listener is less engaged to start with.

There is a small but growing literature on the way humor and laughter is experienced with respect to groups, leading to three main findings. First, laughter is indeed associated with ingroup communication. Pollio and Bainum (1983) for instance, showed that groups who produce more laughing and joking perform better in a problem solving task. One recent naturalistic study carried out by Dezecache and Dunbar (2012) shows that a laughter event usually includes a slightly smaller number of interlocutors than the conversational group size, making it an intimate event. This work generally supports Dunbar's Vocal Grooming Hypothesis by showing that a form of "chorusing" plays "an important role in facilitating everyday social interaction and bonding" (Dezecache and Dunbar, 2012, p. 778). Curry and Dunbar (2013) further argue that shared knowledge is necessary for processing a joke. As they noted, this interpretation is consistent with Flamson and Barrett's *encryption theory*(2008), which argues that humor succeeds, at least in part, because it entails the revelation of knowledge that is shared among only some interlocutors while being kept hidden from others.

Second, people tend to laugh more when they perceive they are part of an ingroup rather than an outgroup context, and they also laugh more with people who are cognitively similar (Wolosin, 1975). For example, Platow et al. (2005) reported that participants laughed and smiled more in reaction to humorous material when (canned pre-recorded) laughter was attributed to an ingroup audience as opposed to an outgroup audience, in an experiment that relied on facial motion coding from video recordings. Previous prominent results on this topic came from Provine (1992), who showed that people tend to laugh and smile more when they

1. Canned jokes – which are the source of humor here – rely on a speaker's telling a story (akin to those found in the text-comprehension literature) that is expected to have a humorous ending.

hear and see others doing so, an effect that is stronger with friends than it is with strangers (Smoski and Bachorowski, 2003). Similarly, people smile more (Hess et al. 2002) and attribute smiling expressions – a behavior that is associated with valued characteristics such as attractiveness and warmth – more frequently to ingroup than to outgroup members (Beaupré and Hess, 2003).

Finally, Hodson et al. (2010) argued that laughing as an ingroup member coincides with reacting positively to disparaging humor directed towards outgroups. While invoking Social Dominance Theory (SDT), Hodson et al. reported that those participants who scored higher in Social Dominance Orientation (SDO), a tool for measuring the extent to which participants endorse inequality across groups, reacted more favorably toward outgroup-disparaging jokes. In contrast, individual differences in SDO did not yield significant results with respect to neutral (non-outgroup-disparaging) jokes.

While it appears well established that laughing is more evident when one is among ingroup members rather than outgroup members, this effect has not been fully investigated. Theoretically speaking, one straightforward question that remains to be asked is, what is precisely the source of these parochial effects? Are differences due uniquely to *ingroup favoritism* that emerges when jokes are shared, as Darwin and others suggest, or do the prior observations point to a double-edged sword that also involves a distancing from an outgroup, which would be a form of *outgroup derogation*? Perhaps a derogatory attitude to an outgroup is central to parochial effects and favoritism is actually a secondary result. These possibilities have not been seriously considered individually nor have they been investigated experimentally.

Methodologically speaking, one limitation of nearly all the studies discussed so far is that they have been largely observational (Platow et al., 2005; and see Lynch, 2010, for an investigation that employs coders who make precise observations). Humor and laughter can conceivably be studied with on-line measures as well. So, a more fundamental experimental question is whether more subtle, online measures from electromyography (EMG) – which can directly capture facial muscle reactions to jokes – would confirm differential reactions to in-group versus out-group speakers. If on-line measures do succeed, they would be useful for further establishing the psychophysical reality of parochial effects.

The current work begins with testing a novel paradigm that was designed to address the methodological question. That is, we employed canned jokes, EMG (to gather genuinely on-line reactions to joke comprehension), a second off-line joke-evaluation measure, and two speakers who were described at the experiment's outset as coming from opposing political groups (in order to provide the listener ultimately with both an ingroup and an outgroup interlocutor). Once we demonstrated that the paradigm's measures reveal the existence of parochial effects with

respect to joke comprehension (Experiment 1), we were in a better position to address the theoretical question. As a second step (Experiment 2), we determined the extent to which parochial effects are due uniquely to ingroup favoritism.

2. Experiment 1

In Experiment 1, spontaneous laughing reactions to jokes were assessed during passive listening via facial EMG over the zygomaticus major and the orbicularis oculi. After each joke, participants were asked to give an evaluation of its funniness. These measures allowed us to test whether differences in reactions to jokes emerge among listeners who are ingroup or outgroup members with respect to one of the two speakers. We operationalized the investigation by manipulating the stated political group membership of the two speakers (the joke-tellers), who were described similarly except that one was said to be from the left (politically speaking) and the other from the right. Only at the end of the session did we ask participants to reveal their own political orientation. We point out that participants were blind to the real purpose of the Experiment. The goal of this experiment was to test whether induced affiliations between interlocutors would affect the listener's reaction to humorous utterances, i.e. through the punch line of a joke.

2.1 Method

As a brief overview, participants hear 24 jokes voiced by two speakers – one who was generically described as, among other things, being from the Right and another, who was similarly described, but from the Left. While the jokes were equally distributed among the two speakers across the experiment, the descriptions (which label each of the two speakers) were randomized so that the speakers' labels (as Right or Left) varied across participants. After each joke, participants would rate it and then – for the sake of the experiment's cover story – be asked to evaluate a political proposition.

2.1.1 *Participants*

Forty-seven students (32 females, 15 males, mean age = 24 years +/– 4) were recruited through advertisements in Clermont-Ferrand and were paid 10€ for their participation. Participants' political leanings were determined by asking – only at the end of the session – for whom they would vote in the upcoming French Presidential election. Participants were asked to indicate, for each of the 10 candidates of the French Presidential election, to what extent they were likely to vote for her/him (on a 10-point-scale). Only subjects who revealed univocal right or

left leaning voting intentions were kept for the analysis. Six participants whose political orientations were either centrist (2) or unclear (4 participants equally supported right-leaning and left-leaning candidates) were removed from the analyses. As a result, 41 participants out of the original 47 were included. Of these, 30 can be described as left-winged and 11 as right-winged.

2.1.2 *Stimuli*

The materials consisted of 24 different jokes. Two male speakers (named *Pierre* and *Ludovic*) each recorded two different sets of 12 jokes. The same speaker presented the same set of jokes across all experimental conditions. Selected jokes all shared some common features. First, they all contained a punch line – the source of an inferential process – as a final sentence. Second, the content of the jokes was neutral; that is, the jokes were not sexist, racist or political, and did not contain any slang vocabulary. In a pretest experiment, 50 participants rated 40 jokes on a 7-point scale for their funniness. The 24 highest-rated jokes were kept for the experiment and recorded by the speakers in a natural and informal tone. Examples of jokes appear in the supplementary materials.

The two speakers were introduced as activists with one of two biographies. These generic descriptions were assumed to be non consequential to the design. At the end of each description, the speakers were described as leaning right or left. This distinction has much meaning in France, where the population is divided (roughly equally in size) into these two sides of the political spectrum. Participants were told that the experimenters had chosen two speakers from opposite sides of the political spectrum for the purpose of conducting a well-controlled study. Participants were thus randomly assigned to one of four (2 Generic Descriptions × 2 Political Orientations) between-participant conditions. This means that if a participant was randomly assigned to a condition in which Pierre is denoted as left-wing, it followed that Ludovic was presented with the alternative description and as right-wing. The affiliation condition (Ingroup versus Outgroup) was deduced on the basis of both the speaker and the subject's political orientation (same versus different). The random assignment of participants resulted with Ludovic and Pierre being considered ingroup members by 22 and 19 participants respectively.

From here on, we will refer to ingroup members and outgroup members without considering the manner in which the affiliations arose (although we will later consider subjects' affiliations in our analyses in order to rule out effects linked directly to the participants' or the speakers' political leanings). The expectation was that only the speaker's political orientation with respect to the speaker (Ingroup versus Outgroup) would affect the dependent variables.

As far as the Participant was concerned, the main part of the experiment consisted of 24 political propositions, which required an evaluation (as *totally agree,*

slightly agree, neither agree nor disagree, slightly disagree, totally disagree, don't know) on topics across five categories (see supplementary materials for a partial list of propositions). The propositions were randomly sorted with the jokes, with one political proposition following each joke. The data from the participants' evaluation of the propositions remained unanalyzed.

2.1.3 *Apparatus*

Jokes were presented in a random order on a monitor in an experimental chamber, using E-Prime software (Psychology Software Tools, Pittsburgh, PA). EMG recording and processing conformed to psycho-physiological standards (see Winkielman and Cacioppo, 2001). Two adjacent electrodes were placed over the regions of the left zygomaticus major (cheek) muscle and the orbicularis oculi (eye corner) muscle. EMG was recorded from two additional regions, the corrugator supercilii (brow) muscle as an index of mental concentration (Cohen et al., 1992), and medial frontalis (forehead), as an index of surprise (Topolinski et al., 2009). The skin was cleaned and prepared to reduce electrode-site impedance. EMG signals were acquired with ADInstruments equipment (ML880 Powerlab 16/30) and sampled at 1000 Hz. After acquisition, raw EMG signals were submitted to standard data preprocessing steps and filtered with a 10-Hz to 500-Hz band pass. EMG responses (in micro-volts) in absolute value were baseline-corrected by subtracting these values from the 2-second period before the beginning of the joke. They were scored and averaged over intervals of 500 ms from the beginning of the joke to 10 seconds after the end of the punch line.

2.1.4 *Procedure*

The context of the experiment was unique in that it took place in France during a campaign season, viz. the presidential and legislative elections of 2012. Participants were told that the goal of the experiment concerned the way humor affects the evaluation of political propositions. They were therefore asked to rate each political proposition as sincerely as possible. Participants were tested individually in an experimental chamber and were informed that they would hear a joke before each proposition, in order to be placed in a humorous frame of mind. They were further told that the experimenters had purposefully chosen two speakers from different sides of the political spectrum in order to remain balanced.

After the EMG electrodes were placed, the experiment was carried out through the presentation of 24 blocks, each containing a joke trial and a political proposition. Each joke trial started with a screen presentation of (one of) the speaker's short biography, which would remain displayed throughout the trial. After a 3 second interval, a recording of the trial's joke (spoken by the fictional speaker) was played. This was followed by a 10-second interval, at which point the subject

was asked to rate the joke on a continuous non-graduated scale from 0 (not at all funny) to 100 (extremely funny). Then, a political proposition appeared and participants were required to indicate how much they agreed with the provided statement, after which they continued to the next block. At the end of the 24 blocks, they were presented with the vote-intention questionnaire by screen.

The experimental session (including the post-recording questionnaire about one's voting intentions) lasted approximately 25 minutes. Post-experimental debriefing revealed that participants were unaware of the real goal of the manipulation (they appeared focused on the political propositions), even though we had even gathered information about their own leanings after they completed their task. So, participants did not appear at all aware that the study was actually interested in their reactions to the jokes.

2.1.5 *Data analysis*

After acquisition, raw EMG signals were submitted to standard data preprocessing steps and filtered with a 10-Hz to 500-Hz band pass. Zygomaticus, orbicularis, corrugator and frontalis' responses (in micro-volts) in absolute value were baseline-corrected by subtracting these values from the 2-second period before the beginning of the joke. They were scored and averaged over intervals of 500 ms from the beginning of the joke to 10 seconds after the end of the punch line.

Levels of EMG activity were then separated into two encoding periods. The first period was the presentation of the joke itself. This was to ensure that non-punch line-related activity (such as the topic of the story, the way the speaker was telling the joke, etc.) would not have a disproportionate impact on a participant's EMG reactions when the arrival of the punch line arose. The second – and main – encoding period entailed the 10-second-interval following the punch line. We analyzed two dependent measures: a) the peak reaction at each electrode, which we interpret as a measure of reaction time from the end of the punch line, and b) the intensity of laughter overall, which was judged by averaging across the entire 10-second window.

Data were logarithmically transformed before statistical analyses were conducted, in order to reduce skew in the distribution. Trials that differed from the participant's mean by 3 standard deviations for either the zygomaticus or the orbicularis (1.1 % of the 984 trials) were removed from the analysis (although removing them did not result in any qualitative difference), as well as trials with missing data for one of the measures (1% of the trials). As expected, no main effects or interactions were observed for EMG responses during the joke itself. Therefore, the analyses described in the Results section focus on the 10-second post-joke interval only.

Data were analyzed using the R package "lme4" (Bates et al., 2015). We performed a series of linear mixed-effects models with both subjects and items as crossed random effects (see Baayen, Davidson and Bates, 2008). The main variable of interest was the Affiliation condition (Ingroup versus Outgroup), but we also controlled for Participants' gender and political affiliation, Speaker's affiliation and biography, as well as Order of presentation. We also wanted to investigate how Joke quality interacted with our Affiliation variable. To do so, we used the ranking of each joke relative to its mean rating for funniness among all participants. Each joke thus received a parametric value between 1 (for the best rated joke) and 24 (for the worse-rated joke). All models were evaluated with likelihood ratio tests of the full model with the effect in question against the model without the effect in question. P-values were then calculated with the R package lmerTest and based on Satterthwaite's approximations. Table 1 lists the significant effects of parameters with coefficients, standard errors and p-values from the fitted models.

2.2 Results

2.2.1 *EMG results*

When comparing reactions to jokes across groups based on affiliation, one finds that both zygomaticus and orbicularis activities were stronger among ingroup participants (Means = 0.142 and 0.103, respectively) than they were for outgroup members (Means = 0.125 and 0.089, respectively). The statistical analyses (see Table 1) confirmed that the experimental factor Affiliation had a significant effect on the activity on both the Zygomaticus and Orbicularis muscles ($p = 0.014$ and $p = 0.017$ respectively). They also confirmed that these effects were linked directly to features of affiliation during joke comprehension, i.e. there were no differences linked to speakers' biographies or to participants or speakers' political affiliation. In other words, left-wing and right-wing subjects found the jokes equally funny regardless of the description attributed to Pierre or to Ludovic.

No effect of gender was observed. Joke quality appeared to marginally affect the Group membership variable for the Zygomaticus muscle only. No meaningful effect of order was observed, indicating that muscle activity remained relatively consistent throughout the experiment. Finally, no main effects or interactions were observed for corrugator and frontalis' activities.

The time-course of EMG reactions over the 10-second-interval following the punch line is presented in Figure 1 for the Zygomaticus and the Orbicularis. Peaks of reaction significantly differ between the Orbicularis (mean moment of peak = 4964 ms) and the Zygomaticus (5288 ms), $p < 0.001$. However, no difference was observed with respect to Group Condition, neither for the Orbicularis (moment of the peak in mean = 5038 ms and 4894 ms respectively in the Ingroup

Table 1. List of investigated components in Experiment 1

Measure	Component	Estimate	Standard error	p-value
EMG Zygomaticus	Affiliation (Outgroup)	−0.018	−0.007	**0.014**
	Affiliation*Joke Quality	−0.002	0.001	0.08
EMG Orbicularis	Affiliation (Outgroup)	−0.014	−0.006	**0.017**
	Affiliation*Joke Quality	−0.001	−0.001	0.29
Post-joke Rating	Affiliation (Outgroup)	−4.266	1.553	**0.006**
	Order	0.494	0.113	**>0.001**
	Affiliation*Joke Quality	−0.516	0.223	**0.021**
	For the top-tier jokes: Affiliation (Outgroup)	−2.098	2.142	0.33
	For the second-tier jokes only: Affiliation (Outgroup)	−7.344	2.233	**0.001**

Notes: "Ingroup" is the reference level for the Affiliation variable.

and the Outgroup conditions, $p = 0.30$) nor for the Zygomaticus (5263 ms and 5313 ms respectively, $p = 0.65$). This indicates that the online appreciation of jokes occurs equivalently for all participants and rules out the hypothesis that the speed required to get a joke varies as a function of Affiliation.

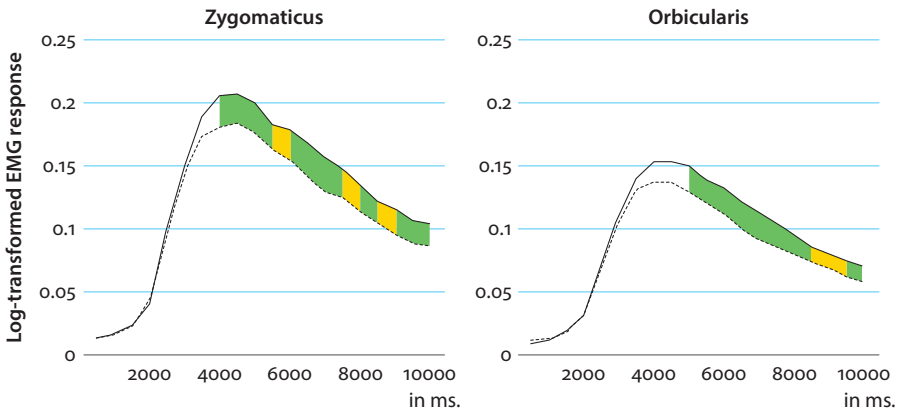


Figure 1. Timeline of EMG reactions in Experiment 1

Differences in the level of activity between the two Group conditions were assessed by paired post-hoc t-tests, for each 500ms timebin (see Table 2). The first timebin in which differences between groups was observed was t + 4000 for the Zygomaticus and t + 5000 for the Orbicularis. This suggests that distinctions between groups arise well into the processing of the punch line.

Table 2. Timelines of the Zygomaticus major and Orbicularis oculi mean activity

Zygomaticus major

Time bin	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500	10000
Ingroup	0.01	0.02	0.02	0.04	0.10	0.15	0.19	0.21	0.21	0.20	0.18	0.18	0.17	0.16	0.15	0.13	0.12	0.12	0.11	0.10
Outgroup	0.01	0.02	0.02	0.04	0.10	0.14	0.17	0.18	0.18	0.18	0.16	0.16	0.14	0.13	0.13	0.11	0.10	0.10	0.09	0.09
T value	*−0.15*	*−0.01*	*0.26*	*−0.45*	*0.53*	*0.99*	*1.62*	*2.38*	*1.99*	*2.19*	*1.91*	*2.22*	*2.53*	*2.29*	*1.93*	*2.15*	*1.89*	*2.81*	*2.69*	*2.36*
p value	*0.88*	*0.99*	*0.80*	*0.65*	*0.60*	*0.33*	*0.11*	***0.02***	***0.05***	***0.03***	*0.06*	***0.03***	***0.02***	***0.03***	*0.06*	***0.04***	*0.07*	***0.01***	***0.01***	***0.02***

Orbicularis oculi

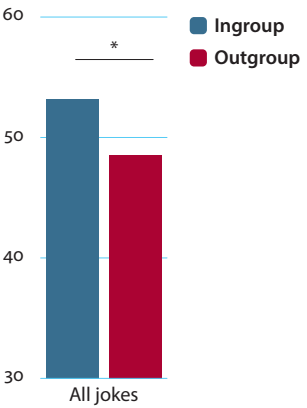
Time bin	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500	10000
Ingroup	0.01	0.01	0.02	0.03	0.07	0.11	0.14	0.15	0.15	0.15	0.14	0.13	0.12	0.11	0.10	0.10	0.09	0.08	0.07	0.07
Outgroup	0.01	0.01	0.02	0.03	0.07	0.10	0.13	0.14	0.14	0.13	0.12	0.11	0.10	0.09	0.09	0.08	0.07	0.07	0.06	0.06
T value	*−0.78*	*−0.38*	*0.64*	*−0.54*	*0.62*	*0.89*	*1.13*	*1.80*	*1.77*	*2.43*	*2.34*	*2.57*	*2.69*	*2.48*	*2.31*	*2.17*	*1.81*	*1.72*	*2.20*	*2.28*
p value	*0.44*	*0.70*	*0.53*	*0.59*	*0.54*	*0.38*	*0.27*	*0.08*	*0.08*	***0.02***	***0.02***	***0.01***	***0.01***	***0.02***	***0.03***	***0.04***	*0.08*	*0.09*	***0.03***	***0.03***

Notes: The statistics test the difference between conditions. Significant two-tailed p values are in bold.

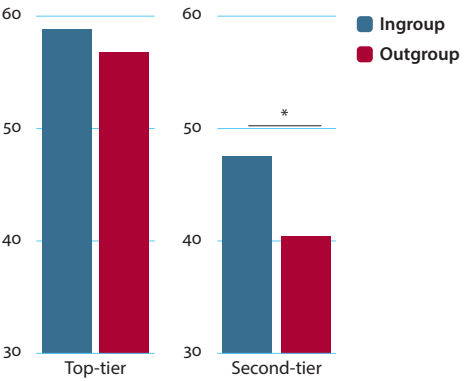
2.2.2 *Post-joke evaluation results*

Joke ratings were expected to be linearly correlated with EMG responses. The analysis computed over the 24 jokes indeed revealed a significant correlation. Joke ratings predicted zygomaticus activation, Pearson's $r = 0.75$, $p < 0.001$, as well as orbicularis activation, Pearson's $r = 0.67$, $p < 0.001$.

Jokes were more highly evaluated $p = 0.006$) when told by an ingroup speaker than by an outgroup speaker (the mean rating for those in the Ingroup condition was 53.2, compared to 48.6 for those in the Outgroup condition, see Figure 2a), again showing that the political affiliation between speaker and listener (the Affiliation condition) was determinative. No effect of gender, speaker's description or participant' political affiliation was observed. Presentation order played a role ($p < 0.001$) in that jokes were evaluated more highly as the experiment continued; however, order did not interact with other factors.



a. Participants' mean ratings **in** function of Affiliation conditions



b. Participants' mean ratings in function of Joke quality and Affiliation conditions

Figure 2. Evaluation of jokes in Experiment 1

The interaction between Affiliation and Ranking of Quality was significant: the lower the ranking of the joke, the higher the Affiliation effect ($p = 0.02$). In addition to this analysis involving a parametric modulation of the jokes' funniness, we performed another analysis in which we split jokes relative to their ranking of quality (resulting in 12 for each group) and called the best 12 top-tier and the rest second-tier. While the mean rating for the *top-tier* jokes was 57.8/100, the mean rating for the *second-tier* jokes was 43.9. Interestingly, whereas we did not observe a parochial effect among the top-tier jokes, second-tier jokes from ingroup interlocutors prompted significantly higher evaluations (+ 7 points, $p = 0.001$) with respect to those told among outgroup interlocutors (see Figure 2b).

2.3 Discussion

Overall, the findings of Experiment 1 show that participants' reactions to jokes vary significantly as a function of their affiliation with the speaker. The differences concern laughter intensity, as well as its (highly-correlated) evaluation ratings for jokes, but they do not concern peaks of laughter, which is our best measure for speed of comprehension. Importantly for our paradigm, the fact that the onset of differences occurred several seconds after the presentation of the punch line indicates that it alone accounted for the reported effects.

We underline three main results. First, EMG responses, i.e. zygomaticus and orbicularis reactions, correlated strongly with each other. Given that Duchenne smiles – as opposed to "false" (non-Duchenne) smiles – involve the combination of zygomaticus major along with orbicularis oculi, the congruence between the two EMG responses suggests that participants' reactions were sincere displays of positive affect (see review from Niedenthal et al., 2010, in which the utility of the Duchenne and non-Duchenne distinction as well as its limitations are discussed). These measures are particularly impressive given that the participants are not socially compelled to respond to the jokes, as speakers were not physically present. Second, the EMG results were also highly correlated with joke ratings, which means that one can assume that joke evaluations are reflective of physiological reactions. Finally, second-tier jokes appeared to be responsible for parochial effects while top-tier jokes were appreciated equivalently among both groups. It is possible that second-tier jokes provide the listener with more flexibility to respond in a way that allowed her to share her appreciation with the ingroup speaker or to distance herself from the outgroup speaker, as we discuss below.

While these effects appear rather clear, we still do not know their source. That is, the parochial effects could be due to participants' reacting more positively to jokes told by an ingroup member but they could also be due to participants' reacting more negatively to the outgroup member. These effects call for clarification.

3. Experiment 2

The aim of this experiment is to investigate the parochial effects further and specifically by introducing a neutral joke-teller. In other words, to determine the source of the difference, we present the same paradigm as before but replace one of (the two politically engaged) speakers with a politically neutral interlocutor. This leads to two pairings of joke tellers, one consisting of a politically neutral joke teller with a politically active joke teller from the left and a second similar pair whose politically active joke teller is from the right. Each participant interacted with one

of the two pairings. Given the high correlations we found between muscle activity and joke-evaluations in Experiment 1, we use only the latter as a dependent measure here.

While anticipating an effect, the new design allowed us to test three outcomes. The first is that a difference in ratings (as reported in Experiment 1) is due to a direct affinity between the speaker and listener. In this case, we would expect that the ratings generated by the ingroup affiliation in the Ingroup-Neutral pairing to lead to higher scores than those given to the neutral joke-teller (in this case, we would expect the Neutral speaker in the pair to provide the benchmark for the ratings generated by the two members in the Outgroup-Neutral pair). The second hypothesis, based on outgroup derogation, is that rating differences are due to sanctions on the outgroup, in which case we would expect the outgroup member's jokes to be evaluated more severely compared to the neutral member's jokes in the Outgroup-Neutral pairing (in this case, we would expect the Neutral speaker in this pair to provide the benchmark for the ratings generated by the two members in the Ingroup-Neutral pair). It might also be the case that the outgroup member plays a more subtle role among these juxtaposed pairs of joke-tellers in that he prompts the listener to demonstrably associate herself with a non-outgroup, in which case one would expect the neutral member's jokes in the Outgroup-Neutral pairing to be more highly evaluated than the outgroup speaker (in this case, we would expect the Outgroup speaker in this pair to provide the benchmark for the ratings generated by the two members in the Ingoup-Neutral pair). Experiment 2 will again consider Joke quality as a variable of interest to determine whether the anticipated effects are due to ratings given to all jokes or just the second-tier ones.

3.1 Method

3.1.1 *Participants*

Eighty-seven people (38 females, 49 males, mean age = 30 years +/− 7), who were recruited in public libraries located in Paris, participated in the experiment. After they completed their task, participants were asked to give their political orientation and engagement on two 7-point scales, ranging from 1 (extreme-left) to 7 (extreme-right) for the political orientation scale and from 1 (not engaged) to 7 (very engaged) for the engagement scale. Based on participants' responses, 47 were politically left-winged and 25 were politically right-winged. Fourteen participants, who rated themselves as neither left- nor right-winged – with a score of 4 on the political orientation scale – were removed from the analysis.

We chose this method because using evaluations of candidates, as we had done a year earlier, would have been non-meaningful. That is, the current experiment was carried out during a period in French politics that was uneventful (relative to

Experiment 1's). Given that only participants with univocal voting intentions were kept in Experiment 1, we assume that the variable for political orientation here is as revealing of participants' preferences.

3.1.2 *Stimuli*

The stimuli used in Experiment 2 were the same as those in Experiment 1, except for the short biographies used to describe the speakers. This time, participants were presented one *Politically active* and one *Neutral* speaker. The roles of Politically active and Neutral speakers were attributed to Pierre and Ludovic in a balanced fashion across subjects. The text describing the neutral speaker was the same throughout and the politically oriented speaker remained identical throughout as well except for the words "left" or "right". Participants were thus assigned to one of two Pairing conditions: *Ingroup-Neutral* versus *Outgroup-Neutral*. As a result, the Experiment is a 2×2 design, which varies with Speaker-Engagement (*Politically active* versus *Neutral*) and Pairing (*Ingroup-Neutral* versus *Outgroup-Neutral*). As in Experiment 1, pairings are ultimately determined by the participants' own political leanings.

3.1.3 *Procedure*

The experimental procedure is similar to that of Experiment 1, except that there were no EMG recordings and that it took place in a library. The same cover story as in Experiment 1 was used; that is, we told participants that the study concerned the impact of humor on people's political evaluations. Again, post-experimental debriefings confirmed that participants were unaware of the Experiment's real goal.

3.2 Results and discussion

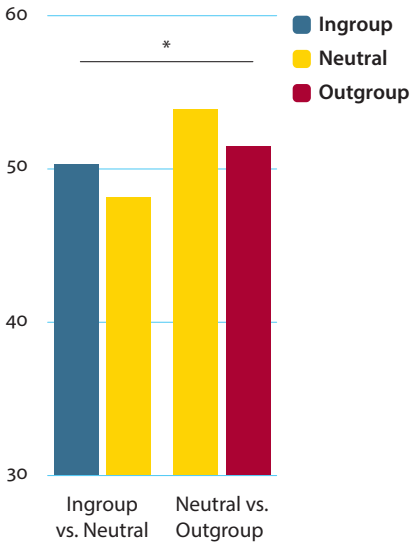
As in Experiment 1, we examined whether political affiliation influenced participants' evaluations of the jokes. The main factors of interest included in the models were Speaker-Engagement (*Politically active* versus *Neutral*) and Pairing (*Ingroup-Neutral* versus *Outgroup-Neutral*). We also investigated whether group membership effects depended on joke quality (as in Experiment 1, we used rankings: 1 for the best rated joke and 24 for the worse-rated joke). Statistical procedures were the same as in Experiment 1. Table 3 presents the results from the fitted models.

Table 3. List of investigated components in Experiment 2

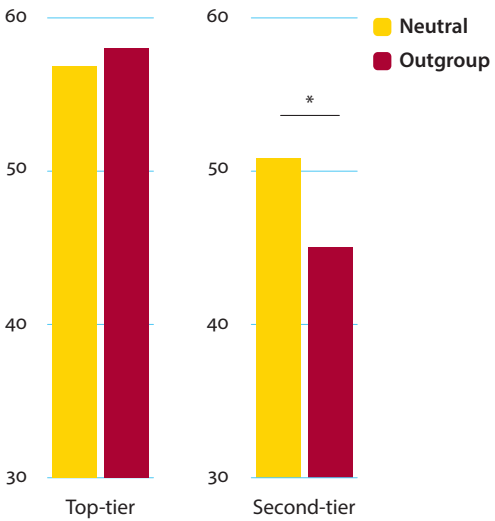
Pairing condition	Component	Estimate	Standard error	p-value
All conditions	Speaker-Engagement (Neutral)	−2.254	1.519	0.138
	Pairing (Outgroup pairing)	1.065	3.470	0.759
	Speaker-Engagement*Pairing	4.817	2.181	**0.027**
Outgroup-Neutral pairing	Affiliation (Outgroup)	3.6066	3.3388	0.28
	Affiliation*Joke quality	−0.4896	0.234	**0.036**
	For the top-tier jokes only:	1.046	2.158	0.62
	Affiliation (Outgroup)	5.882	2.382	**0.014**
	For the second-tier jokes only: Affiliation (Outgroup)			
Ingroup-Neutral pairing	Affiliation (Ingroup)	2.855	3.035	0.34
	Affiliation*Joke quality	−0.048	0.212	0.82

Notes: "Politically active", "Ingroup pairing" and "Ingroup" are the reference levels for the Speaker-Engagement, Pairing and Affiliation variables respectively.

Results for participants' mean ratings of jokes are presented in Figure 3a. With respect to the Ingroup-Neutral pairing, jokes presented in the Ingroup condition were evaluated slightly more highly (mean = 50.25) than jokes presented in the Neutral condition (mean = 48.06). With respect to the Outgroup-Neutral pairing, however, it was jokes presented in the Neutral condition (mean = 53.81) that were more highly evaluated than those told in the Outgroup condition (mean = 51.45). The first interesting remark is that the Outgroup condition prompted higher ratings than the Ingroup condition; although this difference is not statistically significant, it was somewhat unexpected. There were no simple main effects, of either Speaker-Engagement or Pairing alone. However, we observed a significant Speaker-Engagement*Pairing interaction ($p = 0.027$). In other words, participants' reactions to a neutral speaker varied as a function of who that joke-teller was paired with. When paired with an ingroup joke-teller, neutral joke-tellers were not significantly different but they prompted lower ratings; when a neutral joke-teller was paired with an outgroup joke-teller, neutral joke-tellers were again not significantly distinguishable from their partner but they prompted higher ratings. Pairwise comparisons did not reveal any further differences. No effects of order, gender, political affiliation or speaker's description (affiliation or biography) were observed.



a. Participants‘ mean ratings as a function of Pairing and Affiliation conditions



b. Participants' mean ratings in the Outgroup-Neutral pairing as a function of Joke quality

Figure 3. Evaluation of jokes in Experiment 1

In turning to Joke Quality we observed that it interacts significantly with Group condition in the Outgroup-Neutral pairing ($p = 0.036$) but not in the Ingroup-Neutral pairing ($p = 0.082$). As in Experiment 1, we split jokes into *top-tier* and *second-tier* jokes based on the jokes' ranking (Mean rating = 56.54 and 45.15 respectively) and found that the latter set of jokes, but not the former, prompted significant differences in the Outgroup-Neutral Pairing. Second-tier jokes were

evaluated at significantly higher rates when told by the Neutral speaker (Mean ratings = 50.79) as opposed to when told by the Outgroup speaker (Mean ratings = 44.98), $p = 0.014$ (see Figure 3b).

Thus, listeners' affiliations with the politically-active speaker did not provide absolute differences (where an ingroup speaker prompted the highest ratings and the outgroup speaker the lowest). Rather, through the presence of a neutral speaker, the nature of the pairing (of joke-tellers) was determinative of the results. Experiment 2's results indicate that parochial effects are driven, not by a direct affiliation that arises between two ingroup members (between speaker and listener) *per se*. Rather, the data reveal that differences are generated when a listener privileges (even) a neutral speaker over an outgroup member. When neither of two juxtaposed speakers are outgroup members (the Ingroup-Neutral pair), there may be a slight preference for ratings of the ingroup speaker's jokes, but it does not disesteem the neutral speaker to the same extent as the outgroup speaker in the Outgroup-Neutral pairing. Like in Experiment 1, second-tier jokes appear to account for the reported effects. We will discuss these second-tier effects in greater detail in the next section.

4. General discussion

These studies aimed to determine how affiliations between interlocutors would affect a listener's reaction to, as well as her evaluation of, a speaker's joke. The work had two goals. The first was to determine how parochialism affects humor appreciation while a participant was a direct listener and with the added benefit of using EMG's subtle physiological measures (which further allowed us to establish correlations between online measures and post-joke evaluations). Second, we wanted to determine the extent to which laughter depended uniquely on ingroup favoritism. We thus paid close attention to the role played by the presence of an outgroup member.

Methodologically, we had participants listen to jokes told by two speakers. In Experiment 1, the two were presented as being politically active and as coming from the two ends of the French political spectrum (i.e. the only real difference between the two concerned the words "Left" and "Right"). Participants were expected to share a political affinity with one of the two joke-tellers. We found that joke appreciation – as measured by EMG reactions as well as off-line evaluations – was more intense when the listener shared an affiliation with the speaker. A perceived affiliation between a speaker and a listener (and not specific political polarities or speakers' biographies) prompted higher humor appreciation. While this particular result was somewhat expected, this is the first study to capture a parochial effect

with physiological responses while the listener is in direct contact with two speakers whose profiles are distinguishable through a single word.

These differences emerged in what was otherwise a consistent data set. Across all jokes, peak reactions occurred at comparable times post-punch line. Moreover, there were no remarkable differences prior to these peak points, which indicate that punch lines prompt similar effects across the board and that reported differences are due only to participants' reactions as they are comprehending them. The two measures for the EMG were highly correlated with each other *and* with participants' joke evaluation scores. This provides a stable background against which one can describe three findings related to our reported effects. First, this original paradigm validated the anticipated parochialism effects. Second, the on-line effects appear well into the laughing event, i.e. between 4000–5000 ms post-punch line. Third, the reported differences appear to rely on second-tier jokes.

Overall, we take these data as showing that participants are indeed sensitive to the identity of the speaker who is delivering the joke. According to our account, these effects reveal that a listener is put in a position *to show agreement with* an attitude or perspective that a joke is expressing. Note that the willingness to show a shared perspective through a joke is not the same as needing specific knowledge (see Flamson and Barrett, 2008). Whereas a listener could well recognize the point of a joke, e.g. that mothers-in-law are often the source of difficulty for a couple, she might choose to not reveal that she shares the joke's implicit negative attitude and especially not with an outgroup speaker. There is a distinction to be made between understanding a speaker's intended meaning and accepting it (Sperber et al., 2010); arguably, a listener is in the position to choose whether or not an understood meaning is to be publicly acknowledged. Laughter is a form of such acknowledgement. Of course, a listener can just not *get* a joke, but we do not think that any of our jokes fit into that category.

Once our paradigm was able to establish parochial effects with highly correlated on-line and off-line measures, we turned to our second goal, which was to more precisely determine what accounts for the differences. Experiment 2, which juxtaposed a neutral speaker with a politically active one (who was described as being from either the right or the left), used the off-line evaluations to isolate the source of the reported difference. The most remarkable finding was that participants' joke-evaluations were highest for a neutral speaker when he was paired with an outgroup member and lowest for a neutral speaker when he was paired with an ingroup member, resulting in a Speaker-Engagement*Pairing interaction. Joke quality influenced the difference between conditions in the Outgroup-Neutral pairing in that *second-tier* jokes (but not *top-tier* jokes) were evaluated at significantly higher rates when told by the Neutral speaker than when told by the Outgroup speaker. In contrast, no effect of Joke quality was observed when

the experiment paired a Neutral speaker with an Ingroup speaker. We view these findings as indicative of listeners' effort to provide affiliative/positive feedback to the *non-Outgroup* speaker when in the presence, so to speak, of an outgroup member. This is different from suggesting that a) listeners laugh less intensively or rate jokes lower generally when hearing them from outgroup speakers or that; b) listeners laugh more or rate jokes higher more generally when hearing them from ingroup speakers.

We view these findings as consistent with Dunbar's Vocal Grooming Hypothesis, according to which laughter and language developed due to evolutionary pressures to maintain affiliations with a growing number of group members. However, rather than just being a direct source of affiliations, we consider jokes, as well as other forms of communication, as a means to not only verbally "groom" others but to, *monitor* them. Ingroup affiliations are not static over time so it is important for "groomers" to periodically test, confirm, or disconfirm affiliations with other members of the group. According to our view, messages are communicated through laughter so that the listener – by way of her reaction – provides a measure indicating her alignment with the speaker. It also provides a form of punishment, a derogation, for the less-appreciated speaker.

This account leaves unexplained why effects are more evident when focused on the second-tier jokes. We consider two possible and compatible explanations for this effect. One explanation concerns the way laughter is a form of communication between the listener and the speaker. As Weisfeld (1993) argues, "laughter conveys appreciation and gratitude" (also see Hoicka and Akhtar's, 2012 developmental work). Second-tier jokes may provide more flexibility for the listener to recover and to express her appreciation to the speaker with whom she wants to, or needs to, show favoritism.

A complementary explanation lies in the fact that punch lines are inferentially rich utterances that involve the resolution of incongruencies among the propositions expressed by the joke or by gaining access to premises that are tacit or unexpressed (see Hurley et al., 2011; Flamson and Barrett, 2008). The implications of these inferences, while multiple, include recognizing who or what is the object of the laughter. We argue that recognizing who is the laughingstock leads one to make attitude attributions about that person (or thing) and that this becomes part of the speaker's and listener's common ground; the recognition of such shared attributions thus contribute to the mirth enjoyed. While assuming again that lower joke quality provides the listener with greater flexibility to recover, a listener would arguably be more inclined to align her attitude with a speaker about, say, inebriated patients when the joke-teller is someone with whom she is willing to affiliate. When neither of two joke tellers is diminishable (as was the case in Experiment 2's neutral-ingroup pairing), there is more likely to be an absence of parochial effects.

Although jokes are a convenient test case to study, this proposal is not limited to them. That a listener can provide information indicating that she shares affiliations with the speaker can be extended to a host of pragmatic inferences. It makes sense to assume that human cognition (generally) and language comprehension (in particular) are adapted to the specific purpose of monitoring social bonds.

Despite our optimism about these findings on humor and laughter from a social-pragmatic point of view, these experiments open up new questions. For example, these data do not tell us whether the more-highly evaluated jokes are intrinsically funnier when coming from a non-outgroup (rather than an outgroup) member or whether the reactions and off-line evaluations result from *the pleasure of* sharing humor with him. Nevertheless, we believe that the main finding – that the mere presence of an outgroup member modulates the joke appreciation more generally – ought to be a fruitful starting point for further investigations in this vein.

To conclude, we obviously concur that cohesion is crucial to the survival of human groups (no matter how impermanent a group may be). We also find it reasonable to assume that laughter and language have been adapted for the specific purpose of establishing and maintaining social bonds. However, we would take this hypothesis one step further and suggest that what is arguably at stake with social laughter is the establishment, maintenance and *monitoring* of affiliations. The presence of an outgroup speaker in a conversational context reveals the extent to which listeners are implicitly aware of who is sharing a perspective with them. When possible (e.g. when a joke is mediocre enough so that a listener's reactions can be better controlled), listeners show – not direct favoritism towards an ingroup member but rather – disesteem for an outgroup member and to the point that any non-outgroup member benefits. This indicates that Darwin's "joyful meeting between attached members of the same social community" is mirthful at least partly because attached members have a derogatory attitude towards those coming from another undervalued group.

Acknowledgments

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