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Disaffiliative Humor in Improvised Musical Interactions: An Experimental Study

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Abstract

Many studies have highlighted the connection between humor and impolite behaviors. In the present paper, we investigate whether such disaffiliative humor extends to the musical case, relying on a previously collected corpus of free improvisations in which duos of musicians took turn in endorsing both affiliative and disaffiliative social attitudes towards one another. Over the course of three studies, we show that improvisations were found to be more amusing when the performers were engaged in disaffiliative behaviors towards one another than when they endorsed affiliative behaviors. We also show that knowing that the performance is improvised can help disclose part of its humorous content, particularly when such humorous content inherently relies on relational aspects of the performance, such as one performer deliberately attempting to prevent their co-performer from coordinating with them. More generally, we argue for the relevance of disaffiliative humor in thinking about musical humor, beyond well-established forms of musical humor such as parodic quotations or stylistic incongruities.

Keywords: improvisation, disaffiliative humor, interactions, social cognition, music

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1 Introduction

Musical humor is sometimes believed to be something of a novelty, restricted to only a few selected musical compositions, genres, or practices. But it is in fact present in a wide variety of practices, from the Western classical repertoire (Arnason, 2011; Lassauzet, 2019) to post-war Western avant-garde music (Kippelen, 2017); from ritual music (Guillebaud & Stoichita, 2013) to film music (Mera, 2002) and other video-accompanying music (Liikkanen & Salovaara, 2015); from jazz, rock and popular song (Kitts & Baxter-Moore, 2019) to various genres of comic opera (Loriot, 2015). The ubiquity of musical humor is probably at its clearest when looking at contemporary web culture: according to Erickson et al. (2013), for every song that made an appearance to the British Top 100 Singles Chart in 2011, 24 musical videos self-declared as parodies of that song were uploaded on YouTube. All this suggests that musical humor is a crucial component of the relation we have with musical production and consumption.

It is thus not surprising that musical humor tends to be taken more and more seriously by music psychologists. In previous empirical studies, musical humor has mainly been approached by investigating the formal parameters that might elicit laughter, smiling, or amusement, such as the presence of contrasts (Rodriguez et al., 2013), stylistic incongruities (Huron, 2004), imitations of laughter (Trevor & Huron, 2018), or surprising endings (Nagy et al., 2022). This focus reflects a general trend in music psychology to think of music first and foremost in terms of structural or acoustic features. However, music is also very much a performative, collective and participatory affair, something that people often do *together* (Blacking, 1973; Cook, 2001) – a view that naturally invites us to consider musical material as inherently social (Clarke, 2005). Thinking of music in terms of socio-interactional features opens a whole new avenue for research on musical humor, by investigating the forms of humor that might arise from the very relations in which the performers are engaged towards one another when playing music together.

Martin et al. (2003) famously distinguished between four humor styles: affiliative humor, self-enhancing humor, aggressive humor, and self-defeating humor. Interestingly, these categories have a strong social aspect, as they refer to types of humor than can be used to enhance one's relationships with others (affiliative and self-defeating humors) or to a type of humor that directly targets the others (aggressive humor, which includes sarcasm, mockery, ridicule, etc.). Note however that these types of humor are not all "social" in the same sense. In affiliative humor and self-defeating humor, humor mainly aims at improving one's relationship with others. So while such humor is clearly directed towards others, it does not necessarily and intrinsically rely on an interactional component: it can typically be achieved through canned joke-telling or embarrassing anecdotes from one's past. Conversely, aggressive humor directly consists in ways of interacting with others: the interaction itself (e.g., mocking or ridiculing someone) is the material of humor here, the very source of any funniness one might ascribe to the situation. A promising path for assessing if there is such a thing as interactional forms of musical humor might thus be to focus on such aggressive humor in musical interactions – and thus look for broadly "aggressive" interactions in which musicians aim at contradicting, ignoring or even mocking one another.

That being said, the category of “aggressive humor” is not without its limits. First, it does not distinguish between various forms of negative interactional humor such as mockery, satire, sarcasm, or cynicism, which may be associated with distinct values or may not even be “aggressive” at all (Ruch & Heintz, 2016). Second, it is mainly framed as a way to enhance oneself at the expense of the others, somehow downplaying the extent to which such forms of humor can also be found funny by the others (including, in some cases, the mocked, see Shoemaker, 2024, for more general considerations on mockery). Third, it does not account for the fact that impolite interactions can also be funny to watch or to hear even when they are devoid of any additional humorous intent – what is referred to by Lorenzo-Dus (2009: 100) as “incivility-as-spectacle,” the sense of amusement that might result from attending to agents engaged in impolite interactions, and which can be accounted for by various mechanisms such as arousal (through the added tension that comes with aggressivity), superiority (feeling superior to someone who have been belittled), and incongruity (the violation of social/linguistic expectations). For all these reasons, we will prefer here the broader category of “disaffiliative humor” suggested by Marta Dyenel (2013) to refer to the funniness (be it intentional or not) one could find in interpersonal interactions that tend to distance the interacting partners from one another, whatever the means used to create this distance.

While such disaffiliative humor has until now only been studied in the context of verbal interactions, the mechanisms identified to explain such form of humor are in no way tied to the specific resources of natural languages. It is thus only straightforward to wonder whether disaffiliation would similarly be found to be a source of humor when attending to musical interactions. This is precisely what the present paper aims to do, by experimentally assessing the extent to which disaffiliative musical interactions are found to be more amusing than affiliative musical interactions.

Instances of disaffiliative musical interactions might sometimes be encountered in the written repertoire. For example, Edward Klorman (2016) shows how Mozart’s chamber music should be understood as a deeply social practice – one that is meant to embody a social interplay between friends, capable of “deceiving, challenging, opposing, seducing, interrupting, or agreeing with one another” (p. 290), as in the Finale of Mozart’s Horn Quintet in which, to quote a recent program announcement, “the strings seem to gently mock the limitations of the solo instrument [the horn]”¹. Closer from us, and maybe more strikingly, in Cornelius Cardew’s *The Great Learning* (1971) – a highly influential work in experimental music – performers are explicitly asked at some point to find a way to ridicule their co-performers’ attempt at creating “beautiful” sounds: “Players make sounds they think are beautiful, making them beautifully, spacing them and arranging them in a manner they think beautiful in the general context. Three times try and make neighboring sounds sound stupid or ugly in the general context” (Paragraph 5, “Beautiful Sound Music”).

However, we argue that collective free improvisation (henceforth abbreviated as CFI) provides a far more ideal setting to study the relation between disaffiliative interactions and musical humor. CFI is indeed a musical genre in which the very shape and content of the performance emerge from the unfolding interaction between the musicians (Borgo, 2005), without relying on pre-defined plans or pre-existing musical

¹ <https://nospr.org.pl/en/kalendarz/mozart-i-jego-satyra>.

structures (Pressing, 1984; Canonne, 2018; Saint-Germier & Canonne, 2022).² In that sense, in CFI, interactions between the musicians are the very source of the music and not merely a by-product of the individual musicians jointly following a shared score.

Crucially for us, in CFI, musicians tend to explore the whole spectrum of socio-musical relations, from positive, supporting attitudes to more negative, agonistic ones (Golvet et al., 2024). As Eric Clarke (2005: 174) nicely puts it, CFI has thus “at least as much to do with an exploration of interpersonal dynamics as it [has] to do with a direct manipulation of musical materials.” This point of view seems to be also shared by many CFI practitioners. According to Corbett (2016: 55), saxophonist Evan Parker once said that “improvisations fall into those that express agreement, those that express disagreement, and those in which the participants agree to disagree.” And Corbett goes on writing that “improvisation is social music. The shapes it takes and the methods used to make it are collective in nature, often gregarious, interactional. But there are anti-social elements in the music, too, solitary, uncommunicative moments, times when the collective is shunned in favor of the individual. The antisocial impulse helps keep the music from growing predictable” (pp. 56-57). In other words, although free improvisers are ultimately engaged in an activity with a shared goal (i.e., creating aesthetically valuable music) which they jointly strive to achieve, such shared goal is sufficiently indeterminate – and the aesthetic background of improvisers might be distinct enough (Watson, 2004) – to allow for a wide variety of interactions between the improvisers, including ones that are arguably more disaffiliative (such as contradicting, ignoring, imposing, or mocking).

That being said, in the absence of clear acoustic or musical criteria that would be non-controversially associated with such disaffiliative behaviors, it might turn out to be difficult to identify them as they happen over the course of the long and complex performances – often with a large number of musicians involved – that are typical of CFI.

For our study, we thus chose to rely on a more controlled corpus of duo improvisations recorded for the research conducted by Aucouturier & Canonne (2017), and fully available at <https://archive.org/details/socialmusic>. For their studies, Aucouturier and Canonne asked 10 duos of improvisers to record a series of short performances (1-2 minutes) in which one of the improvisers would have to endorse a given social attitude (chosen amongst five possible attitudes: being domineering, being caring, being insolent, being disdainful, and being conciliatory) towards their co-improviser, who then had to guess which attitude was being enacted. This yielded a corpus of 100 improvisations, 20 for each social attitude. Crucially, the attitudes provided to the musicians strongly differed in their degree of affiliation, thus providing us with an ideal set of experimental stimuli to investigate whether disaffiliative interactions would lead to more humorous results than affiliative interactions.

An additional benefit from using this corpus was the availability of the musicians’ individual tracks (i.e., in which each musician is heard in isolation, without any of the sounds that have been actually performed by their co-improviser), allowing us to assess

² As stated in Saint-Germier & Canonne (2022: 456), “instead of explicitly agreeing on some structure before they start to play, CFI performers leave the direction of the music to choices made only in the course of performance. This does not mean, again, that CFI is made out of nothing. It is just that the various materials and resources that can be used by the performers are left open and implicit (thus allowing for a large amount of dissensus and negotiation in the performance).”

whether specifically interactional cues (only present within the duo excerpts) made a difference in the perception of disaffiliative musical humor. Finally, the chamber music-like character of these recorded duets made it equally plausible to present them to participants either as compositions or as improvisations, thus allowing us to assess whether disaffiliative behaviors were more likely to elicit amusement when they were perceived as spontaneously and directly expressed rather than as merely enacted as part of a pre-determined fictional musical dialogue orchestrated by the score's composer.

2 Study 1

2.1 Methods

2.1.1 Participants

26 participants (mean age = 26.615; women: 16; men: 10) were recruited for this first study through the INSEAD-Sorbonne Université Behavioural Lab. All participants signed an informed consent and were compensated at a standard rate.

2.1.2 Stimuli

As explained above, the corpus of improvisations from Aucouturier & Canonne (2017) was built around 5 social attitudes. Among them, two were explicitly construed as disaffiliative attitudes: being insolent (to quote from the instructions that were given to the improvisers: "People with this attitude wants their partner to understand that they have no respect for them, and believe their position is illegitimate") and being disdainful ("people with this attitude want to emphasize that they are different from their partner, and make them feel that they do not really belong to the same universe"). Two other attitudes were explicitly construed as affiliative attitudes: being conciliatory ("Even though people may be very different from one another, or even disagree with each other, people with this attitude make an effort to step in the other's direction") and being caring ("People with this attitude attend to their partner's every wish and need; often, they will even try to anticipate them"). The remaining one – being domineering – was somehow ambiguous in the definition provided to the performers as it combined disaffiliative elements (domination/forcing) with more affiliative aspects (leading/guidance), and was thus excluded.

We then searched for the duos that had managed to successfully express all of our four target attitudes (i.e., the attitude expressed by one of the improvisers was correctly decoded by their co-improviser). 7 duos (out of 10) were thus identified. Finally, we selected the 5 duos who had reported the highest levels of success in the task (in Aucouturier & Canonne's study, after each improvisation, the musicians tasked with

expressing a social attitude were asked to assess how well they thought they did on a 7-point Likert scale). It was important to have the same instruments go through each one of our four social attitudes, since some instruments might be more closely associated to humor than others (Mera, 2002).

This yielded a total of 20 improvisations: 4 performances (two with a negative social attitude – being disdainful and being insolent – and two with a positive social attitude – being conciliatory and being caring) from 5 different duos (piano/saxophone; euphonium/tuba; clarinet/guitar; double-bass/viola; flute/viola). Each improvisation was cut to a 55-second excerpt, starting from the first sound played in the performance and ending with a 1-second linear fade out.

In order to assess whether the interaction between the musicians made any difference in humor evaluations, we also selected the corresponding solo tracks of the musicians tasked with encoding the social attitude and similarly cut them to 55-second excerpts, starting from the first sound played in the track and ending with a 1-second linear fade out.

2.1.3 Procedure

Participants were randomly assigned to one of two groups: the “duo” group (in which participants listened to the 20 “duo” excerpts) and the “solo” group (in which participants listened to the 20 “solo” excerpts). Participants then listened to the 20 excerpts (10 “affiliative” excerpts and 10 “disaffiliative” excerpts) in random order. After each excerpt, participants had to rate, on a continuous scale, the extent to which they found the music to be funny/amusing³ (from “Not at all” – 0 – to “Very much” – 10).

In short, our first study followed a mixed factorial design, with *Number of musicians* (i.e., whether participants are presented with the duo or the solo versions of the excerpts) as a between-subjects factor, and *Type of relation* (i.e., affiliative or disaffiliative) as a within-subjects factor.

2.2 Results

In order to assess the impact of our two experimental factors (Number of musicians; Type of relation) on participants’ ratings, the data were analyzed through a 2-way ANOVA, using the EZ package in R. As shown in Figure 1, our statistical analysis revealed an absence of main effect of Number of musicians ($F=0.005$, $p=0.946$, $\eta^2<0.001$) and a main effect of Type of relation ($F=63.434$, $p<0.001$, $\eta^2=0.201$), such that participants found

³ Note that our experiment was conducted with French-speaking participants. We chose to use the term “amusant” (“à quel point avez-vous trouvé la musique amusante?”), which corresponds to both “funny” and “amusing” in English, rather than “comique” or “humoristique,” which are more closely associated with the presence of humorous intention. As explained in the introduction, it was important to us to also explore the humorous effects of disaffiliative behaviors, even when there was no intent to be funny (which was arguably the case when improvisers were trying to be disdainful towards one another and even maybe when they were trying to be insolent). Moreover, “musique humoristique” or “musique comique” tend to refer in French to specific genres. “Musique amusante” was more neutral in this respect, and thus more appropriate for our study.

excerpts in which one musician expressed a disaffiliative behavior ($M=4.917$; $SD=1.620$) to be more amusing than the excerpts in which one musician expressed an affiliative behavior ($M=3.423$; $SD=1.421$). There was not interaction between our two factors ($F=1.111$, $p=0.302$, $\eta^2=0.004$).

Our results thus show that there was indeed something funnier in hearing improvisers display disaffiliative interactions, than in hearing them display affiliative interactions.

However, whether participants had access to the full interaction between the two musicians or only one individual part did not make any difference in their perception of musical humor. Two reasons can be advanced to explain this striking result. On the one hand, it might be that participants were not really sensitive to the interactive cues contained within the excerpts (i.e., how the musicians behave towards one another) but rather relied on more global acoustic and musical properties (such as the presence of incongruous musical quotations, unusual sounds and instrumental timbres, or basic parameters, such as loudness, pitch height or brightness, that were all already present in the solo version of our excerpts). Such unsensitivity to interactional cues might be due to the lack of expertise of our participants – who had no previous exposure to free improvisation – and were thus probably not in an ideal position to assess whatever humor could have been displayed in the performances (see Huron, 2006: 378: “Perhaps the closest to an acid test for musical cultural understanding is that of musical humor”). This would be in line with the results from Aucouturier & Canonne (2017), who found that non-expert listeners did in fact mostly listen to duo improvisations as if they were solo – focusing on the overall sonic result rather than on the ongoing interactional process between the two musicians.

On the other hand, it might be that the solo version of our excerpts contained additional humorous cues, that were not present in the duo versions, and that somehow compensated for the absence of humorous cues associated with the to-and-fro between the two musicians. Our solo excerpts were indeed constructed by abstracting one individual track from the overall duo improvisation. In doing that, we ended up presenting our participants with excerpts that contained abnormally long stretches of silence (i.e., there was nothing anymore to hear when only the other musician was playing). This might have reinforced the weirdness, or even “cringiness” of the music, turning our musical excerpts into absurdist or surreal performances, which might in turn have elicited a somewhat humorous reaction in our listeners⁴. Unfortunately, our data do not allow us to decide between those two explanations, but we come back at this issue from a slightly different angle in Study 2 below.

⁴ In a musically very different context, Gretchen Wheelock (1991: 30) already mentions the role played by “uncomfortable silences” in Joseph Haydn’s humorous music.

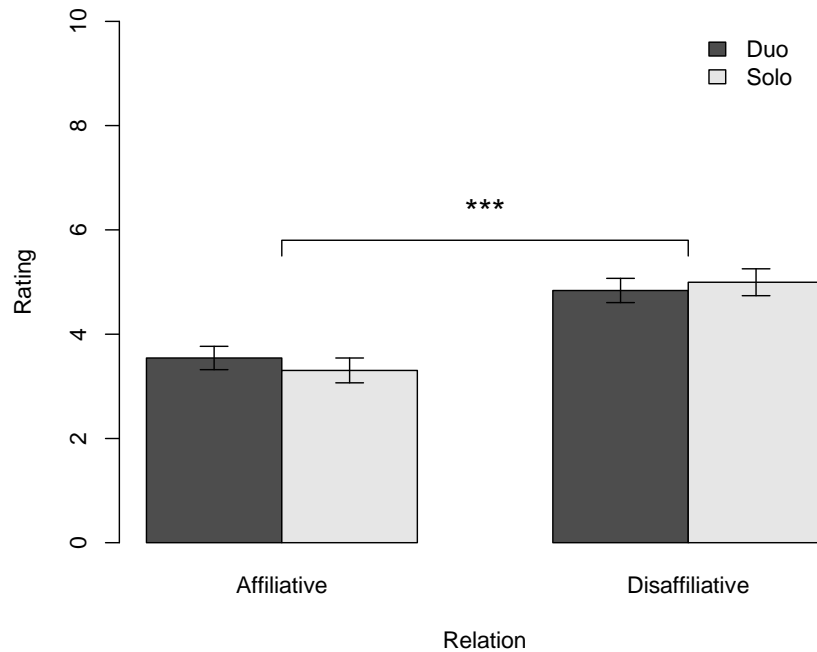


Figure 1. Results from Study 1. Error bars show standard error (95% interval), and the black asterisks shows a significant difference between excerpts in which the relation between the two musicians was disaffiliative and excerpts in which the relation was affiliative ($p < 0.001$).

3 Study 2

Our first study showed that humor ratings were not significantly different whether participants listened to the *two* musicians interacting with one another, or to only *one* musician from the duo. As such, it remains possible that disaffiliative relations are found to be more amusing than affiliative relations not because of how the interaction itself unfolds, but because musicians simply change the sounds they are using when they enact some kind of disaffiliative behavior (such as being insolent towards one’s co-improviser) – and that these sounds are found to be more amusing than the sounds that would be used in a more typical affiliative behavior (such as displaying a caring attitude). In short, disaffiliative relations could be found to be more amusing than affiliative relations not in virtue of the socio-musical interactions they generate but in virtue of the individual sonic behaviors they prompt.

To assess this possibility, we added another layer to the experimental design used in our first study, which contrasted the duo version of our excerpts with their solo counterparts. This time, we also did manipulate the very way the excerpts were presented to the participants: either as “improvisations, spontaneously generated by various duos of musicians,” or as “compositions for two instruments, written by various composers.” In both conditions, the music would be exactly the same; but the underlying assumption was

that participants would be more likely to focus on the overall sonic result rather than on the ongoing relation between the two musicians when they imagined that the musicians were performing something that had been previously conceived by a single mind (Canonne, 2018). Conversely, it seemed reasonable to expect that the interactional dynamics between the two musicians would be made more salient when hearing a given duo performance as an improvisation rather than as the performance of a composition. If the kind of musical humor displayed through disaffiliative interactions has indeed something to do with how the musicians relate to one another, then duo performances should be found more amusing when listened to as improvisations, rather than as compositions.

But manipulating the mode of presentation could also affect the perception of musical humor for a different reason: as Canonne (2021) suggested, it could very well be that improvisations are found to be more amusing than compositions, all things equal otherwise, because of the wit and quick thinking that are required to generate music in such a spontaneous way, making whatever funny element we might encounter within the performance even more amusing. Having participants listen to the solo versions of our excerpts allowed to control for this possibility: if improvisation makes things funnier simply because it prompts to focus on the wit of the performer, then both solo and duo versions should be found more amusing when listened to as improvisations, rather than as compositions. Conversely, if improvisation makes things funnier because it prompts us to hear music as an ongoing interaction between musicians (and not only as the product of such interaction), then only the duo versions should be found to be more amusing when listened to as improvisations, rather than as compositions. No such difference should be found for solo performances since, obviously, there is no interaction whatsoever to be heard in that case.

3.1 Methods

3.1.1 Participants

65 participants (age = 25.423; women: 50; men: 15) were recruited for this second study through the INSEAD-Sorbonne Université Behavioural Lab. Participants from Study 1 could not enroll. All participants signed an informed consent and were compensated at a standard rate. 3 participants were excluded: one because of difficulties in performing and understanding the task, and two because they declared that the music they heard was highly unpleasant, eliciting a strongly negative experience.

3.1.2 Stimuli

For this second experiment, we once again relied on the corpus of improvisations from Aucouturier & Canonne (2017), focusing this time only on the disaffiliative attitudes (i.e., being insolent and being disdainful), which had been shown in Study 1 to be found more amusing than the affiliative attitudes. In the original corpus, 9 “Insolent” improvisations

had been correctly decoded by the co-improviser; one of these was over 8 minutes long, while the other were short miniatures of 1-to-2 minutes, and was thus excluded. As for the “Disdainful” improvisations, 13 of them had been correctly decoded by the co-improviser and, to have the same number of improvisations for both types of attitudes, we selected the eight improvisations for which the musicians had reported the highest levels of success. No additional editing was done to the improvisations.

We also selected the corresponding solo tracks of the musicians tasked with encoding the social attitude, starting from the first sound played in the track, with no additional editing.

3.1.3 Procedure

Participants were first randomly assigned to one of two groups: the “duo” group (in which participants listened the duo version of our excerpts) and the “solo” group (in which participants listened to the solo version of our excerpts). Participants from each group were then randomly assigned to another one of two groups: the “impro” group (in which participants listened to the 16 excerpts presented as spontaneous improvisations) and the “compo” group (in which participants listened to the 16 excerpts presented as performances of written music). Participants then listen to the 16 excerpts (8 “insolent” excerpts and 8 “disdainful” excerpts) in random order. After each excerpt, participants had to rate, on a continuous scale, the extent to which they found the music to be funny/amusing (from “Not at all” – 0 – to “Very much” – 10).

In short, our first study followed a mixed factorial design, with *Number of musicians* (i.e., whether participants are presented with the duo or the solo versions of the excerpts) and *Mode of presentation* (i.e., whether the excerpts were presented as improvisations or compositions) as a between-subjects factor, and *Type of relation* (i.e., whether the improvisers were aiming at being insolent or disdainful) as a within-subjects factor.

3.2 Results

In order to assess the impact of our three experimental factors (Number of musicians; Mode of presentation; Type of relation) on participants’ ratings, the data were analyzed through a 3-way ANOVA, using the EZ package in R. Our statistical analysis revealed an absence of main effect of Number of musicians ($F=0.260$, $p=0.612$, $\eta^2=0.004$), an absence of main effect of Mode of presentation ($F=0.604$, $p=0.441$, $\eta^2=0.010$) and a main effect of Type of relation ($F=20.643$, $p<0.001$, $\eta^2=0.081$), such that, overall, Insolent improvisations ($M=5.076$, $SD=2.732$) were found to be funnier than Disdainful improvisations ($M=4.384$, $SD=2.611$). There was also a significant interaction between Mode of presentation and Type of relation ($F=4.536$, $p=0.038$, $\eta^2=0.019$). As shown in Figure 2, this interaction seemed to be driven by Disdainful excerpts. Post-hoc t-tests (using the Benjamini & Hochberg (1995) correction for multiple comparisons) revealed that the duo versions of Disdainful excerpts were judged to be less amusing when they were listened to as compositions ($M=4.108$, $SD=2.565$) than when they were listened to as improvisations ($M=4.978$, $SD=2.612$) ($t=-2.541$, $df=221.93$, $p=0.047$). But strikingly,

there was no such difference when it came to the solo version of Disdainful excerpts ($t=-0.654$, $df=189.83$, $p=0.685$). Similarly, while there was a marginally significant difference between the solo versions ($M=4.239$, $SD=2.629$) and the duo versions ($M=4.978$, $SD=2.612$) of Disdainful excerpts when participants thought the excerpts were improvised ($t=-2.052$, $df=200$, $p=0.083$), no such difference appeared when participants thought the excerpts were composed (solo version: $M=3.994$, $SD=2.552$; duo version: $M=4.108$, $SD=2.656$; $t=-0.320$, $df=201.47$, $p=0.750$). As for Insolent excerpts, they were always rated in a highly similar way, whatever the condition.

Our results thus suggest that believing that something is improvised does not necessarily make it more amusing. But they also show that such belief can prompt listeners to focus on aspects of the performance (i.e., the socio-musical relations between the musicians heard in the duo versions of our excerpts) that might otherwise end up being overlooked, despite playing a key role in certain forms of musical humor. Our pattern of results indeed suggests that both types of excerpts elicited distinct kinds of humor. Whatever humor is contained within Insolent excerpts seems to be largely independent of the musicians' interactional dynamics. However, the kind of humor afforded by Disdainful excerpts seems to be at least partly dependent on our perceiving the performance as an ongoing socio-musical interaction. While prompting our participants to pay attention to the spontaneous interactional dynamics did not make any difference in how they found Insolent improvisations to be amusing, it did make a significant difference in the case of Disdainful improvisations. Here, participants were more likely to find the performances to be amusing when they were thinking of the relation they heard between the two instruments as a live socio-musical interaction between the musicians rather than as a sonic property of a pre-composed musical structure.

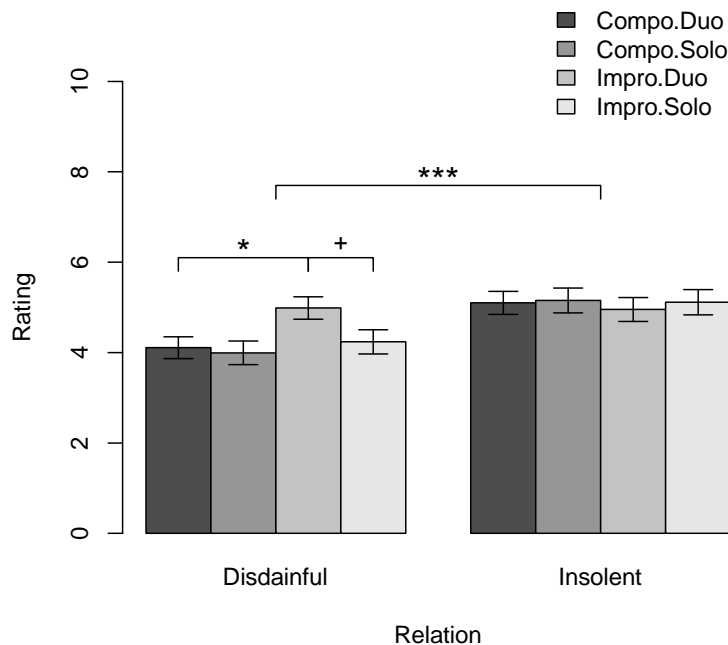


Figure 2. Results from Study 2. Error bars show standard error (95% interval). * represents significant differences, with a threshold of $p < .05$; ***: $p < .001$. + represents a marginally significant difference ($p=0.083$)

Now, one remaining question is whether there is something in the acoustical structure of our two types of stimuli that might explain the pattern of results found in this study. We thus conducted additional analyses in order to further investigate the differences between our two types of stimuli, and to shed light on the types of humor they could be associated to.

4 Study 3

4.1 Methods

4.1.1 Stimuli

Our analyses were conducted on all Insolent and Disdainful improvisations recorded for Aucouturier & Canonne (2017), i.e., 40 improvisations (20 Insolent and 20 Disdainful). We chose to include in our analyses performances in which the social attitude expressed by an improviser had not been correctly decoded by their co-improviser for two reasons: first, it made our corpus more comparable in size with the kind of corpus that are analyzed in Music Information Retrieval (MIR) Studies, which typically include a high number of recorded tracks; second, it allowed us to systematically compare the sonic behavior of a same musician, as they alternatively enacted Insolent and Disdainful attitudes.

4.1.2 Procedure

Three types of analyses were conducted: acoustical analyses – on sonic features of the audio stream jointly produced by the two performers; behavioral analyses – on features of the individual audio stream of the musician tasked with encoding the attitude; and a dynamical analysis – on the temporal unfolding of the performance.

For the acoustical analyses, an energy-based musical activity detection algorithm from McFee et al. (2015)'s Librosa package for Python was applied to cut the silent frames, so that the analyses would only be conducted on parts of the performances in which at least one of the performers was playing. For each track of our corpus, four features were then extracted frame-by-frame also using Librosa (McFee et al., 2015): Fundamental frequency (which provides an estimate of pitch height – the higher the more high-pitched), Root-Mean-Square (which provides an estimate of loudness – the higher the louder), Spectral centroid (which provides an estimate of timbral quality, with low values typically associated with dark timbres and high values typically associated with bright timbres), and Spectral flatness (which provides an estimate of the tonal quality,

with low values associated with purer tones, and high values associated with noisier tones). Finally, frame-by-frame extracted values for each acoustical feature were averaged for each recorded track of our corpus.

For the behavioral analyses, we first computed for each track in our corpus the proportion of silence contained within the individual audio stream of the encoder, using the same energy-based musical activity detection algorithm as above. This was meant to estimate the extent to which the musician was playing in a continuous (or, conversely, discontinuous) fashion. Second, we computed the spectral stability (or, conversely, instability) of the encoder's track. To do so, we computed the self-similarity matrices (Foote, 1999) for each encoder's track as it indicated to what extent the musician was playing with a similar timbre over time. High values in these matrices imply a high spectral proximity between associated time frames. The mean value of each matrix was computed and used to report the percentage of values in the matrix that were above this mean. All in all, this score (in %) provides a good indicator of the musician's timbral stability over the excerpt.

Finally, for the dynamical analyses, we aimed at quantifying how surprising was the unfolding of the performance through Shannon entropy which, according to information theory, can predict how much each frame deviates from expectations based on past observations (here, the previous 100 frames, corresponding roughly to a 1s window, and thus allowing to capture a recent musical context). To do this, we computed for each frame, the Kullback-Leibler divergence (KLD) between both current probability distribution (obtained by normalizing the current frame) and expected probability distribution (obtained by normalizing the mean of the past 100 frames). To have only one value per recorded performance, we extracted the average KLD value.

4.2 Results

For the metrics used in the acoustical analysis, paired t-tests (using the Benjamini & Hochberg correction for multiple comparisons) showed that the Spectral centroid was significantly higher for Insolent improvisations than for Disdainful improvisations ($t=3.997$, $df=19$, $p=0.003$); that RMS was marginally significantly higher for Insolent improvisations than for Disdainful improvisations ($t=2.0935$, $df=19$, $p=0.066$); and that Spectral flatness was significantly higher for Insolent improvisations than for Disdainful improvisations ($t=2.495$, $df=19$, $p=0.044$). In a nutshell, Insolent improvisations were brighter, louder, and noisier than Disdainful improvisations. This suggests that Insolent performances were more likely to be associated with high tension arousal than Disdainful improvisations (McAdams et al., 2017).

For the metrics used in the behavioral analysis, paired t-tests revealed that the musicians tasked with expressing the social attitude were more spectrally stable when they were trying to be insolent than when they were trying to be disdainful ($t=-2.208$, $df=19$, $p=0.040$); they also had less silence in their playing in Insolent improvisations than in Disdainful improvisations ($t=-2.313$, $df=19$, $p=0.040$). The behavior of musicians was thus both more discontinuous and more unstable in Disdainful interactions than in Insolent interactions. This suggests that, in Disdainful interactions, musicians tried to

make themselves less predictable, thus making it harder for their co-improviser to coordinate with them.

Finally, for the dynamical analysis, a paired t-test revealed a significant difference between Insolent improvisations and Disdainful ones, the former having significantly more entropy than the later ($t=2.223$, $df=19$, $p=0.039$), suggesting that Insolent performances might have been perceived as more surprising than Disdainful ones. Overall, we found three important differences between our two types of improvisation that might explain the pattern of results observed in Study 2. First, Insolent improvisations were likely to be more arousing than Disdainful improvisations. Arousal having shown to be positively linked to amusement (Godkewitsch, 1976), this might explain why Insolent improvisations were found on average to be more amusing than Disdainful improvisations. Second, Insolent improvisations were likely to be more surprising than Disdainful improvisations. This is in line with most accounts of humor which emphasize the role of incongruity in the perception of humor. Third, the individual behavior of musicians tasked with being disdainful was more discontinuous and unstable. While the resulting sonic output might have been judged to be awkward and/or poorly executed when listeners believed it had been composed, it might have been much more amusing to think of the very same output as a social behavior in which one of the musicians was doing everything they could to prevent their co-performer to coordinate with them.

5 Discussion

Our studies showed that improvisations were found to be more amusing when the performers were engaged in disaffiliative behaviors towards one another than when they endorsed affiliative behaviors. This extends the relevance of disaffiliative humor to the musical case, and should invite us to consider such musical impoliteness as an interesting resource for further investigations on musical humor. We also found that believing that the music was improvised did not systematically increase the amusement of listeners, but that it could prompt them to pay more attention to the ongoing interactions between the improvisers, which can turn out to be a source of amusement in and of itself. Taken together, these results suggest an interesting connection between CFI and humor. Because of its highly social nature, free improvisation provides performers with interactional resources that might be put to use to elicit fun or amusement amongst audience members. Composers could of course strive to mimic the highly diverse socio-musical relations that are encountered in free improvisation, but this would likely end up being a very taxing process. Conversely, those socio-musical relations are readily available to performers freely improvising together: in fact, they constitute the very fabric of the music itself.

Our results are also worth further discussing in light of more general humor research.

First, we found that Insolent improvisations were found to be the most amusing of the four behaviors enacted by the improvisers, and that their unfolding was likely to be perceived as more surprising than the Disdainful performances. It might be that, in this case, improvisers were intentionally trying to be funny (e.g., by using typical forms of

aggressive humor to convey insolence), explaining why, on average, the resulting music was found more amusing. Further experiments – involving e.g., improvisers that would be explicitly asked to perform humorous vs serious music – would be required however to fully disentangle humor-as-intention and humor-as-perceived in the musical case, allowing us to more systematically explore e.g., the distinction between intentional humor and unintentional humor, or cases of failed humor (Bell, 2015).

Second, we found that the improvisations that were judged more amusing (i.e., Insolent improvisations) had acoustical characteristics – such as being louder and brighter – that are typically associated with higher tension arousal – although the extent to which our participants were actually aroused when listening to the excerpts remains unknown. This is line with recent humor theories that have been suggesting a positive relationship between arousal and amusement. According to Alan Roberts (2019), arousal is a key ingredient in humor: on the one hand, arousal – at least when it’s not overwhelming – can increase our feeling of amusement; on the other hand, the incongruities or cognitive dissonances that are typically elicited by funny objects (e.g., a joke) can be seen as “inherently increasing arousal” (p. 114). While establishing such a theory in the musical case would require, first, to systematically manipulate the acoustic properties of musical stimuli, and, second, to track listeners’ levels of arousal, our results can be seen as a preliminary step in assessing the connection between arousal and musical humor.

Third, and contrary to what was hypothesized by Canonne (2021), we showed that knowing that the performance was improvised was not sufficient in itself to increase the listeners’ feeling of amusement. In particular, humor ratings were pretty much the same whether the participants believed that the solo they were listening to had been improvised or composed, suggesting that the kind of experience that is entailed by improvisation (i.e., attending to the thought process of the performer) does not necessarily increase already present feelings of amusement. That being said, two alternative explanations might be brought forward to explain this result. It might be that believing that something is improvised increases amusement only in the case where we are strongly amused. Improvisers already need to achieve reasonably well their aesthetic or expressive goals in order for our emotional responses to be increased by the apprehension of the improvisers’ physical and mental virtuosity. Here, our stimuli may have been found not funny enough in the first place to elicit the kind of emotional intensification suggested by Canonne (2021). It might also be the case that (falsely) believing that our improvised performances were compositions actually increased their comic appeal, but for a totally different reason. Listening to the performance of a composition comes with its own set of normative expectations, both at the structural level (we expect some degree of internal consistency) and at the performative level (we expect the performance to exhibit a sufficient degree of instrumental mastery), which were maybe not satisfied by the corpora used in the above studies. In other words, listened to as compositions, our improvisations might have been taken as examples of “bad” music; and as Justin London (2021) argues, the absence of musical skill and taste can cause laughter. In the words of Justin London: “We are, alas, laughing *at* rather than laughing *with* the performer in these instances, and our laughter is a form of derision” (p. 331). But note that bad performances – which ostensibly fall short from all the standards we have come to expect when listening to a professional musical performance – can also be found funny when they are clearly voluntary. In that perspective, bad performances would not be funny (only) in virtue of

the feeling of superiority they elicit among the listeners, but also because of the sheer incongruity between the actual performance and the social or cognitive framings it entails. Anecdotal evidence from our post-experiment debriefings partly supports this interpretation: when asking them the criteria they relied on to make their judgments, several participants indeed reported that they found it funny when performers “played their instrument badly on purpose.” Again, more systematic investigation would be required to disentangle this complex web of interrelations between normative expectations, mode of production, and musical humor.

While we did not find that believing that the performance was improvised always made it more amusing, it was nevertheless the case for the “Disdainful” performances. Here, knowing that the performance was improvised helped disclosing the music’s humorous content: the incongruence between the individual voices, which was typical of Disdainful performance, was presumably made more salient when the participants thought of the music as the emergent result of a spontaneous social interaction. In other words, at least in certain cases, properties related to the mode of production of the performance (i.e., is it improvised or pre-composed?) can make a difference in the appreciation of its humoristic dimension. These results provide additional grounds to refute aesthetic empiricism, the position according to which properties relating to an artwork’s origin or provenance are not relevant in the evaluation of its aesthetic properties (Lamarque, 2010). Listening to music as an improvisation (rather than as a composition) can indeed make a difference in the evaluation of an aesthetic property as important as the music’s humorous content, at least in some cases. This is in line with the qualitative study conducted by Canonne (2018) which showed that groups of participants attending to the very same music, but either as a duo improvisation or as a composition for two instruments, had two very different listening experiences. Our present studies complement this previous work, but through more quantitative means.

Fourth, our results point towards the existence of two distinct forms of disaffiliative musical humor: one that relies on referential properties (e.g., imitations of vocal sounds, musical quotations), and that has mainly to do with how the music actually sounds; and one that relies on relational properties (i.e., on the relations between real or imaginary agents heard within the music) and that has mainly to do with the agential perception of the music (Levinson, 1996). Prototypical Insolent and Disdainful improvisations (which can be heard in full at <https://archive.org/details/duo-02-07>) respectively exemplify both types of disaffiliative humor⁵. On the one hand, some Insolent improvisations (see the saxophone player in Duo 03-08) are replete with rapid, high-pitched, staccato sounds that clearly evoke laughter, which can be in itself a source of amusement (Trevor & Huron, 2018); others exhibit motives played in a distorted fashion that sounds like a sarcasm or mockery (see Duo 04-02 at 12’’ for an example); others yet rely on out-of-context musical quotations that constantly disrupt the musical flux (see the piano part of Duo 02-05 for an example). On the other hand, some Disdainful improvisations show the improvisers deliberately avoiding playing at the same time (see Duo 03-05 for an example); in others, the two musicians use timbral and musical materials that are highly heterogeneous (see Duo 10-06 for an example); in others, yet, improvisers do everything they can to mimic a non-interactive situation, as if

⁵ The complete set of “Insolent” and “Disdainful” improvisations can be found with the rest of the corpus recorded for Aucouturier & Canonne (2017) at <https://archive.org/details/socialmusic>.

the two musicians were playing in two separate rooms (see Duo 02-07 for an example). While such musical situations might be seen as examples of “bad” compositions for duos of instruments, they can become funny once we adopt an agential perspective, and hear the music as two personae ostensibly avoiding each other.

Disaffiliative humor has been overlooked in previous taxonomies of musical humor (Eriksen, 2016) – most probably because such taxonomies generally rely on individually-composed music rather than on collectively-improvised music – but we argue that it constitutes one of the important manifestations of musical humor, particularly in collective musical practices. However, we do not mean to claim that disaffiliative humor relies on wholly distinct mechanisms. In particular, disaffiliative humor clearly relies on incongruities. This is obvious in the case of the out-of-context quotations found in Insolent improvisations, but the kind of relations exhibited in Disdainful improvisations also create many kinds of sonic incongruities (e.g., between the timbral material of the two instruments), as well as a broader sense of incongruity between the apparent discoordination displayed by two musicians and our expectation that these musicians should aim at playing “together.” Disaffiliative humor also points towards the relevance of the slightly less-popular “play” theory (Apter, 2013) for explaining musical humor. An important reason for why we might find Disdainful performances amusing is indeed the sense of play they entail: we hear the musicians playing a game (an “I avoid you, you avoid me” kind of game), we feel the deeply ludic nature of what is going on in the music, we imagine the musicians having fun, and that causes our feeling of amusement. While such a ludic appreciation of the music produced might have been particularly strong in the case of the Disdainful improvisations, we suspect that many other types of relations explored in collective improvisation elicit a similar sense of playfulness, which might in turn led to a humorous reaction.

Fifth, and finally, our results suggest an interesting relationship between negativity and musical humor. Many forms of humor seem to involve some kind of negativity: just think of irony (which often involves a contradiction between a verbal statement and the situation it is referring to), absurd humor (which often rely on the constant negation of social, physical, or even logical expectations) or caricature (which often focuses on the most unflattering physical attributes of a given subject). In fact, the whole superiority theory of humor (Carroll, 2014) is based on the idea that we find an object or a character funny when we can feel superior to it, which often requires, in a way or another, the belittlement of said object or character. Certain genres of humor also inherently rely on negative emotions. Cringe comedy is a case in a point: the amusement it elicits is indissociable of the high level of embarrassment it aims at evoking (Hye-Knudsen, 2018), and any laughter that arise might be both a sign of amusement and a way to ease the embarrassment we are meant to feel. In that perspective, there is no reason why musical humor should be fundamentally different from other forms of humor. Negative interactions between the musicians can indeed easily give rise to the various forms of humor alluded to above: they can lead in turn to ironic, absurd, or even cringe results. The “destructive” nature of many forms of musical humor has often been highlighted (Bernstein, 2005). But this “destructive” element is generally conceived in relation with something that is external to the musical piece itself: broad stylistic rules that are negated, other musical genres or pieces that are parodied, etc. Our studies suggest that such negativity can in fact be embedded within the musical performance itself, in the very

relations between the performers. In that sense, relational musical humor is both highly intra-musical (in the sense that it only depends on the interactions between the musicians) and highly extra-musical (in the sense that it requires to think of these interactions as not only sonic, but also fully social). And it might well be the case that the humor created through negative musical interactions stems from this ambivalence. Disaffiliative humor is undoubtedly one way for music to be funny: unpacking its many dimensions and investigating more systematically its prevalence within musical practices should pave the way for exciting new research in the domain of musical humor.

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Authors contributions

C.C. designed the experiments. C.C. and Y.T. collected the data. C.C. analyzed the experimental data. Y.T. analyzed the musical stimuli. C.C. interpreted the results. C.C. wrote the manuscript.

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Supplementary Material

The difference observed in Study 1 between affiliative and disaffiliative interactions could very well be due to the nature of the corpus used for that study. It is indeed possible that, to express attitudes such as disdain or insolence, which are not likely to be found as such in a more ecological context (contrary to positive attitudes such as being caring or conciliatory, which may be closer to what could be encountered in real-life situations), improvisers had to resort to completely anti-musical strategies, resulting in highly incongruous or caricatural behaviors that elicited a humorous reaction from our participants. In order to control for this possibility, we replicated the results observed in Study 1 using another corpus of freely improvised musical interactions.

Methods

Participants

Participants were the same as in Study 1. The order in which they did the two experiments was counterbalanced.

Stimuli

For this replication study, we relied on the corpus of free improvisations described in Golvet et al. (2024). In these performances, the musicians improvised freely, without any specific constraint. However, after each performance, musicians were asked to indicate, using a continuous annotation interface, how they intended to relate to their co-improviser at each point of their joint performances (i.e., were they intending to play with, against, or without their co-improviser) (see Figure S1). That corpus was then used by Wolf et al. (2023) to create three sets of excerpts, each one containing 16 20-second excerpts: one set in which both musicians were in the “with” area for the whole duration of the stimulus; one set in which one musician was in the “with” area while the other musician was elsewhere in the triangle for the whole duration of the stimulus; and one set in which neither musician were in the “with” area for the whole duration of the stimulus. The stimuli are available here (<https://researchbox.org/1287>).

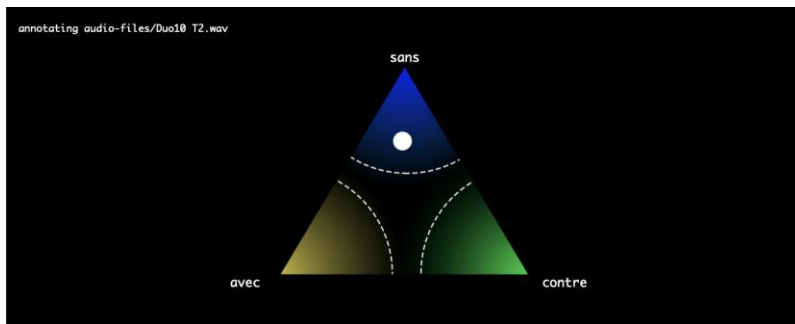


Figure S1. Interface used by the participants for the annotation task in Golvet et al. (2024). The improvisers could navigate continuously within the triangle to indicate the intensity with which they conformed with a given relational intent, with white dashed lines delineating the limits of each area. The black area in the center corresponds to an area of interactional indeterminacy. Here, “without” in on top of the triangle, “with” on the bottom left, and “against” on the bottom right.

For our own purpose, we only retained the two sets of stimuli in which the relation between the two musicians was either clearly affiliative (both musicians intending to play with one another) or clearly disaffiliative (neither musician intending to play with one another). From the remaining stimuli, we eliminated the two stimuli (one from the “disaffiliative” set and one from the “affiliative” sets) which contained a singing voice: the musician was indeed singing in an imaginary language, which could have given reasons to participants to find the excerpts funny that had nothing to do with the ongoing interaction. We thus ended up with 30 stimuli, 15 with an affiliative interaction between the musicians and 15 with a disaffiliative interaction between the musicians.

Procedure

Participants listened to the 30 excerpts in random order. After each excerpt, participants had to rate, on a continuous scale, the extent to which they found the music to be funny/amusing (from “Not at all” – 0 – to “Very much” – 10).

Results

As shown in Figure S2, a paired t-test revealed that excerpts in which improvisers did not intend to play with one another were found to be funnier ($M=4.062$; $SD=2.627$) than excerpts in which improvisers did intend to play with one another ($M=3.451$; $SD=2.373$) ($t=3.995$; $df=389$; $p<.001$).

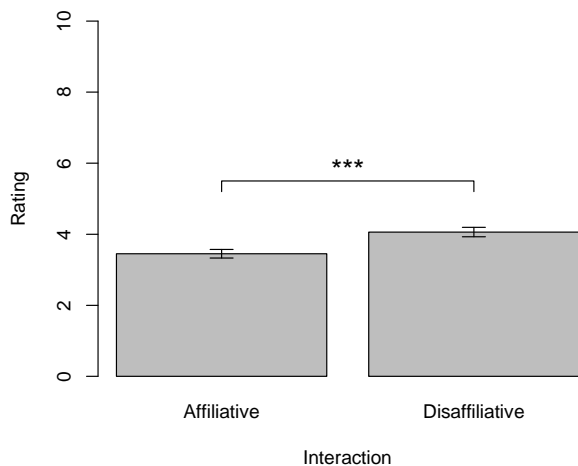


Figure S2. Error bars show standard error. (95% interval); *** represents a significant difference, with a threshold of $p < .001$.

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