Lost in Co-curation: Uncomfortable Interactions and the Role of Communication in Collaborative Music Playlists

SO YEON PARK, Stanford University, USA
SANG WON LEE, Virginia Polytechnic Institute and State University, USA

Online tools enable users to co-create artifacts remotely. However, creative collaborations can also occur for the social process of collaboration itself, for which measures of success and engagement expectations can be more ambiguous, and individuals' dedication and social dynamics more important. Co-curating music in collaborative playlists (CPs) is one example of creative collaboration that encompasses both roles, and can therefore have more subtleties within its interactions. We conducted two studies using online surveys to understand perceived comfort with and hesitation toward the social dynamics embedded in CPs. Differences in collaborators' ownership perceptions toward CPs and their comfort in interacting with these CPs emerged. We also found a varying desire for situated communication, dependent upon the action taken and perceived ownership (of both a CP and the songs contained), with more users expecting greater comfort when a communication channel exists. From these results, we present four design considerations for more positive and engaging experiences in creative online co-curation.

Additional Key Words and Phrases: Online collaboration, Collaborative co-curation, Music playlist, Communication channel, Collaboration discomfort, Hesitation, Ownership, Questionnaire, Survey

1 INTRODUCTION

Online collaborations are ubiquitous, from working together on word processing documents and programming to creating animations and music together [13, 26, 39, 40, 49, 53, 56]. Much knowledge has been gleaned from such collaborations, including frameworks for groupware [22, 27, 76] that have been applied to many collaborative platforms (e.g., Google Docs, Figma). Typically, these collaborations are a means to an end (i.e., the creation of a collaborative artifact, such as co-authoring an academic paper for publication). Another kind of online creative collaboration is one in which collaborators engage for the social process of collaboration itself, without a clear end point, as in co-curation, where the collaborative process itself is often the reason for engagement [59].

Co-curation of music in the form of collaborative playlists (CP) is one example of such a collaboration. Collaborations on CPs are unlike those on production-based platforms, which have clearly defined end points [13, 49], and also uniquely connects collaborators (much as social media platforms do) by tapping into the inherently social nature of music [55, 59]. Notably, users have been found to engage in CPs for both *social* (e.g., sharing and bonding over music) and *cognitive* (e.g., discovering new music and learning others' tastes) purposes [59], giving CPs a tendency toward ambiguous points of termination and measures of success. Furthermore, even though the songs contained in CPs are not the collaborators' own creations, individual efforts (e.g., adding songs) toward the curated list can differ drastically across users. Therefore, disparities in perceived ownership of the CP or individual song contributions can arise, prompting collaborators to take seemingly disrespectful actions and impeding harmonious collaboration, as alluded to by previous work [57]. Lastly, the curation process being rather subjective, challenging to justify, and a matter of taste poses additional difficulties for co-curation. Given the complex nature of online co-curation, is it appropriate to directly apply existing design principles that have matured in the context of work and productivity? Or, are there additional considerations necessary for collaborators in CPs, given their social, enjoyable, and ambiguous (in terms of termination and ownership) nature?

Authors' addresses: So Yeon Park, Stanford University, Stanford, USA; Sang Won Lee, Virginia Polytechnic Institute and State University, Blacksburg, USA.

Despite the complexities inherent in CP engagement, the interaction afforded in current CP platforms takes a more rudimentary form relative to production-based collaborative systems. Spotify's CP features, for example, consist of adding, deleting, and reordering songs in a playlist. There is no support for communication centered around the artifact, possibly implying that communication in music co-curation is unnecessary. Despite this, communication around CPs emerged as a factor for successful CPs; while some users resorted to external communication methods, others who did not were found to feel discomfort regarding the perceived lack of communication around CPs [58]. "Awkwardness" [13], or discomfort, has been found to arise in a creative collaborative context where perceptions of individual ownership abound. This comfort with collaborators' personal behavior is critical, as it is one of the factors found to hinder or support collaboration [12]. CPs are also a context where perceived ownership can differ across collaborators, consequently affecting the comfort and enjoyment experienced by each user [57]. As CP users become more numerous, and as people rely increasingly on CPs to stay connected — especially during times of social distancing[1] — resolving such hurdles to ensure smooth and collaborative CP interactions is increasingly important.

In this paper, we aim to understand how curation activities are perceived within the context of CPs depending on the types of changes that a user makes to a CP (adding, deleting, and reordering songs) in scenarios that may give rise to differing ownership models (Study 1). In addition, we aim to understand what needs exist for communication, given the current lack of a channel for communication (Study 2). The following research questions were articulated for this investigation:

- (Study 1) RQ1: What are collaborators' comfort in interacting with the CP?
  - RQ1a: How does comfort vary with action type (add, delete, reorder)?
  - RQ1b: How does comfort vary across scenarios (who initiated the CP, who took an action)?
- (Study 2) RQ2: How do communication features in CPs affect perceived comfort and collaboration in interacting with CPs?

We address these research questions through questionnaire-based studies with CP users on perceived comfort and discomfort with each of the actions taken in varying scenarios; as well as interactions through, and evaluation of, a communication channel for CPs (Study 1: $N = 100$; Study 2: $N = 67$). In doing so, we hope to shed light on implications for users of current tools and offer design insights for platforms providing these collaborative functionalities.

Our work contributes knowledge of what online curation platforms ought to help mediate between collaborators. By providing greater understanding of collaborative curation, our findings can inform future directions for designing collaborative platforms for creative pursuits in general.

2 RELATED WORKS

Understanding interactions within CPs starts with situating them in existing literature on online collaborations that have served as a foundation for co-curation tools.

2.1 Online creative collaboration

Online collaborations are ubiquitous, and the reasons for engagement are diverse. People "co-author papers, iterate designs from conception to final form, or negotiate a plan through an evolving blueprint" [76], and code together [26, 56]. Oftentimes, these online collaborations are *production-based*; that is to say, they begin with the intention of producing a final product to be published or released — be it a paper, object, structure, or web application. We review these productivity-based collaboration tools and research on them as predecessors for online creative collaboration.

[1] https://newsroom.spotify.com/2020-03-30/how-social-distancing-has-shifted-spotify-streaming/, Access October 13, 2020.

2.1.1 Collaborative writing. Among many production-based collaborations, online collaborative writing has been investigated at length, and we find similarities to collaborative writing in CPs — each individual can take similar actions (adding, deleting, reordering) and each author's subjective view can be reflected in content and organization. The importance of awareness was also underscored in collaborative writing: co-authors made efforts to share information and noted the importance of features that help to heighten awareness (e.g., change tracking, version control) [5, 53]. In line with this, Birnholtz et al. [7] found communication to be vital to collaborations; they observed participants without access to chat functionality using text editing features to communicate. This desire to communicate, even when a chat box is unavailable, underscored the importance of communication when co-writing, and we investigated this in the context of CPs. Collaborative writing now takes place "more often" and has become "more complex" [80] as it commonly involves personal purposes in addition to work- and education-related documents; occurs on a larger scale (involving more than two collaborators); and features the use of functionalities for "leaving comments by the side" (e.g., "track changes and comment", "suggestion mode") [80]. Similar to an observation from prior work on a "non-collaborative pattern of interaction" [74], Wang et al. [80] found that despite advances in collaborative writing technology, users still expressed unwillingness to write together with others, suggesting room for further improvement in technological development.

2.1.2 Collaborative animation- and music-making. More recently, investigations directed at understanding creative online collaboration have also been emerging, building upon works on human-computer interaction to support creative pursuits [72]. Research in creative online collaborations has mainly been production-based, focusing on collaborations with an end — such as creating animations, stories, and programs that get released to the public [13, 40, 41, 45, 49, 65, 67].

In the context of "collabs" — "multi-author, collaboratively-made animations" — Luther et al. [49] found that successfully completed collabs involved more frequent communication among members, with leaders in these collabs posting three times as many messages as those of failed collabs. Within the collaborative music-making context, Bryan-Kinns et al. [13] found that mutual engagement was enhanced when participants were explicitly encouraged to collaborate. Contrary to initial hypotheses, contributions were more active when explicit cues for contributors' identities were not provided. Authors suggested that the explicit identity could imbue a sense of "ownership" and thereby cause "social awkwardness with deleting others' contributions" (more on ownership in § 2.3). As current applications also make evident the contributors and the original creator of the CP, we also explore this notion of "deleting others' " in the context of music co-curation.

Tools for creative co-production have also brought forth insights into collaborative strategies. Through Ensemble, Kim et al. [40] found that 60% of contributor activity took the form of creating comments and drafts, and that prior collaborator relationships mattered: friends preferred equal division of power, and in the same vein, leaders preferred to lead a team of strangers.

2.2 Collaborative curation

Especially prolific during times of physical distancing, online collaborations occur in social settings for engaging with others, such as sharing (e.g., image [19, 29, 69], song [57]) or playing games together [23, 71, 73]. One such collaboration, which includes CPs, is co-curation. Co-curated collections of creative artifacts, such as mood boards and music playlists, may be production-based and finalized for a specified purpose; oftentimes, though, they are constantly iterated upon as there is no clear end to the collaboration. Thus, co-curation literature, and how perceived ownership and social norms are formed around curated collections, is particularly relevant to our work.

2.2.1 Collaborative image curation. Pinterest is an image-sharing platform that allows users to collect and organize images into boards, thereby facilitating the digital virtual consumption [19]

of images. Within this notable research context of social curation, three social actions — liking, repinning, and commenting — have been found to be most common; of these, Hall and Zarro found that commenting is the "least frequently observed" yet "most illuminating" user action [29]. Despite the rapid growth in Pinterest users, they found civility in comments, and dissenting opinions were usually accompanied by apologies and reasoning [29]. While these social actions are available on the platform, Pinterest is positioned for personal use, and "personal acts of collection are subsumed by public acts of curation" [48]. These aspects of Pinterest are at odds with Spotify's CPs, which are positioned as being for the exclusive social use of those who are collaborating (i.e., CPs are considered "private" and not available to the general public).[2] Due to these fundamental discrepancies, Spotify's CPs are perceivably distinct from Pinterest's group boards.[3]

2.2.2 Collaborative music curation. Music is inherently social [10, 11, 30]. Numerous efforts have aimed to amplify this "highly social activity" [68] of music listening: prototypes have been built for music to be shared socially, and user studies based on these have been conducted [3, 42, 46, 47]. Music streaming platforms — from widely adopted platforms (e.g., YouTube, Spotify) to lesser-known sites (e.g., Turntable.fm,[4] JQBX) — have also implemented features to facilitate greater social listening. Among many social features, the CP has been one impactful way in which music has been shared, and it has proven to be a meaningful feature, having also been added to other prominent platforms.[5] Even though online co-curation of music has been practiced for more than a decade [24], research on today's forms of music co-curation is relatively scarce.

A recent work relating to CPs showed 65% of its Spotify-user participants engaging with CPs, and it identified three purposes for engaging in CPs: practical, cognitive, and social [59]. The *practical* purpose encompassed creating a CP for the artifact itself (e.g., a playlist for a party) and for the process (in other words, making a CP could be "intrinsically enjoyable"); the *cognitive* purpose was to discover and learn about music as well as the collaborators; and the *social* purpose involved sharing and bonding over music. Within existing literature, the cognitive and social nature of CP engagement and the practical purpose of CPs can provide dual perspectives on users: focusing either on the resulting artifact or on the engagement process itself. Therefore, CPs are likely to bear characteristics of, and also prone to issues that arise in, both production-based collaboration and social interaction. Moreover, CP collaborators were found to have different usage patterns and emotions from each other; multiple purposes for engaging in CPs; and experience of their CP's purpose evolving "from the collaborators' original intent" [57–59].

Due to this hybrid and dynamic nature of CPs, user interactions within them may be more difficult to predict, and certain design implications may not be transferable. In light of these characteristics, CPs pose a unique context that we do not yet have a good understanding of, and which requires more investigation. Hence, an understanding within the CP context of the interface type which best promotes collaborators' awareness, and which is best suited to the effects of and user needs around communication channels, is needed, especially as the most widely used platform for CPs does not provide this functionality.

2.3 Perceived ownership and comfort in collaboration

Psychological ownership characterizes the object being connected with the self [83], or "extended self" [6, 21]. Such feelings of ownership extend beyond the material, and increasingly toward the

[2] https://developer.spotify.com/documentation/general/guides/working-with-playlists/, Accessed October 15, 2020.
[3] https://help.pinterest.com/en/article/group-boards, Accessed October 15, 2020.
[4] The site became defunct in December 2013 but users have been calling for its revival with the shelter-in-place order instituted due to the COVID-19 pandemic [20].
[5] YouTube Music recently added collaborative playlists for their Android users [1].

immaterial [4, 62] — from thoughts [18] to objects in augmented reality [63], even including such collaborative artifacts as Wikipedia articles [28, 77]. Psychological ownership emerges through "routes" of controlling, intimately knowing, and investing oneself in the target [61]. As such, greater investment leads to greater psychological ownership of writing (i.e., editors have lower ownership than publishers) [9], as do autonomy and better "cyber self-identity" in virtual communities [44].

Psychological ownership can bring about greater citizenship behavior, personal sacrifice and assumption of risk, and stewardship toward the target [62]. For example, collaborating writing encouraged "joint responsibility" and more receptive behaviors, while peer editing did not lead to any ownership of the text [50]. Psychological ownership has also been found to increase satisfaction and contribution quality [44] and is particularly valuable "when a hierarchical style of collaboration is crucial to success" [77] — as in the case of Wikipedia.

However, psychological ownership can also lead to territoriality — "the expression of ownership toward an object" [77]. Territoriality in shared tabletop workspace emerged spatially as personal, group, and shared territories, and understanding these help collaborators coordinate their actions [70]. Claiming rituals were found as one way of asserting such territoriality on Pinterest [69]. These negative effects of psychological ownership translate to being "unwilling to share" the artifact, feeling the "need to retain exclusive control over it", as well as engaging in behaviors "that violate group norms and threaten the well-being of the group" [62]. Such behaviors can hinder cooperation and cause dysfunction (e.g., by deterring new member participation) [62, 77].

Collective psychological ownership, a sense of ownership at a group level, can also occur concurrently with individual psychological ownership [60]. Based on collective recognition of shared action on the target (i.e., traveling down the "routes" of ownership together), collective ownership can reduce controlling behavior and fear of infringement among interdependent coworkers [60].

Ownership issues have also been alluded to within the CP context: Park and Kaneshiro found that user contribution and engagement were affected by uneven ownership, which in turn affected their enjoyment of the playlist [57]. Yet psychological ownership of CPs has not been investigated further — we lack an understanding of which contexts incline certain collaborators toward feeling greater ownership, whether territoriality arises within CPs or more receptive behaviors are witnessed, and whether collective ownership is felt. Therefore, in our study, we investigate various scenarios of initiation and contribution that give rise to nuances in users' perceptions of ownership.

3 STUDY 1: COMFORT IN CP ACTIONS AND CP OWNERSHIP

To facilitate and improve users' CP experiences, we first need to understand how CP interactions are perceived and felt. Specifically, we investigated comfort with CP actions (add, delete, and reorder) across scenarios (who creates and who acts on the CP).

3.1 Method

We created a questionnaire in which CP users evaluated interactions in given scenarios that participants have most likely experienced.

3.1.1 Scenario interactions. To understand how ownership impacts comfort with CP actions, we created scenarios based on who *creates* the CP and who *acts* upon it (Fig. 1). We separated the entities who create and perform actions — the participant ("I") and collaborators ("others") — as this could engender different senses of CP ownership. We presented scenarios in the form of "textual narratives" [25], as the narrative format helps to "envision user requirements of (future) system use" within the use cases and contexts in human-computer interactions [14, 25]. The following textual narrative for the oCreate_iAct scenario — referring to the participant taking action (iAct) in

a CP created by their collaborator (oCreate) — exemplifies the scenario descriptions presented to our participants:

> "(Scenario: You are revising the collaborative playlist that your collaborator has started) A month ago, your friend added you and another friend as collaborators to the playlist they'd been curating for a few months, making it a "collaborative" one. Since then, you and your friends have modified the playlist to include songs that all of you enjoy. Today, you've been listening to the collaborative playlist and you want to modify it."

In all three scenarios, we made it clear who had created and who was making a change (action) to the CP. The scenarios involved collaborating with friends, as prior literature found friends to be most frequently mentioned as collaborators in CP users' favorite and first CPs [58]. We also kept constant the amount of prior usage, at one month, to create clear distinctions between the creator and the subsequently added collaborators.

After presenting the scenario, we asked each participant how comfortable they were with carrying out the actions (or with others carrying out the actions, in the scenario of iCreate_oAct). The CP actions we considered were adding, deleting, and reordering songs,[6] and users rated their comfort with each on a 7-point Likert scale from extremely uncomfortable (1) to extremely comfortable (7). For the action of deleting in particular, we broke this action down by who had initially added the song in question, as this distinction was found to be important [13]. In this paper, we use "delete own" to mean deleting a song that the deleting user added to the CP, while "delete other's" means deleting a song added by another collaborator, not the person deleting the song.[7] For example, "delete own" in the iCreate_oAct scenario would refer to a collaborator deleting their own song (oAct) in a CP created by the participant (iCreate). Then, we asked open-ended questions regarding reasons for hesitation in carrying out the four actions, and subsequently asked what would help to make performing these actions more comfortable. We decided not to include the oCreate_oAct scenario, as it would not engage the participants' involvement. We also wished to avoid causing survey fatigue. Therefore, we did not conduct paired analyses with "creates" and "acts" as separate dimensions.

3.1.2 Questionnaire design. Eligible participants were 18 years of age or older and understood the voluntary nature of the study. Upon consent, participants were guided to the questionnaire, which included questions regarding CP usage, scenario interactions, communication patterns, and interface designs. The order of scenarios and interfaces was randomized and evenly presented. Questions were also ordered to garner unbiased responses; for example, the ranking question about communication functionality was asked prior to presenting our interfaces, which could have otherwise biased participants to answer in favor of the communication functionality. Demographic

[6]These are the actions available on Spotify's CPs.

[7]In our survey, we posed the questions regarding the users' comfort in performing deletions without connotations of ownership: "Delete song you added" and "Delete song your friend added".

		Who Acts: I	Who Acts: Others
Who Creates	I	**iCreate_iAct**	**iCreate_oAct**
	Others	**oCreate_iAct**	oCreate_oAct

Fig. 1. Scenarios with two dimensions depending on who *creates* and who *acts*; we presented the scenarios with participant involvement (yellow). The subject is "I" (i) or "Others" (o) from the participant's point of view.

questions were similarly placed at the end, so as to not bias participant responses. Ethics approval for this study was obtained from the ethics boards of the authors' respective universities.

3.1.3 Data analysis. We eliminated data from participants who gave irrelevant text responses to open-ended questions and from those who submitted the survey in under five minutes.

For quantitative responses, we used R [64] and the following packages to analyze and plot the data: tidyverse [82], factoextra [37], and ggpubr [36]. To test for statistical significance, we conducted *t*-tests and ANOVAs. We report their statistical significance in our results and identify them as **** ($p < 0.0001$), *** ($p < 0.001$), ** ($p < 0.01$), * ($p < 0.05$), and + ($p < 0.1$) in our figures.

For qualitative responses, we conducted thematic analysis to derive a coding scheme, which was agreed upon by two researchers through iterations. Two researchers coded all the responses; we report Krippendorf's alpha for inter-rater reliability [51]. Quotes from participants are indicated with participant numbers that start with "P".

3.1.4 Participant demographics. We recruited $N = 193$ participants on MTurk and garnered $N = 132$ (68%) responses from participants who had interacted with CPs in some capacity before (i.e., a higher percentage of CP users than a previous study [59]). We excluded responses from participants who provided irrelevant text responses or submitted the survey too quickly ($N = 32$), leaving us with $N = 100$ full participant responses. The participants engaged with CPs in different capacities: among 100 users, 84% of them had contributed to a CP and 40% had created CPs before (these capacities of engagement are not mutually exclusive). 39% did so at least once per week or at least once per day, whereas 41% engaged with CPs at least once per month. Spotify was the dominant platform used to engage in CPs ($N = 78$). 30% of our participants were female, and 81% of our participants were 25–44 years old.

3.2 Results

We present results on collaborators' comfort levels when interacting with CPs in the three scenarios delineated in Fig. 1 (iCreate_iAct, iCreate_oAct, and oCreate_iAct) and how discomfort might be alleviated in CP interactions.

3.2.1 ***Comfort levels vary by CP action and scenario (RQ1a).*** Comfort levels for CP modifications — adding, deleting, and reordering songs — varied, some more than others, across all three scenarios that we explored. Calculating the overall means, regardless of scenarios, we found that comfort levels were different for each action. Participants exhibited moderate comfort with adding a song (6.22) and slight comfort with reordering (5.11) on the 7-point Likert scale from extremely uncomfortable (1) to extremely comfortable (7). For deleting, the contrast was notable for when the song deleted was originally added by the participant themselves (almost moderately comfortable, 5.67) versus when the song was added by another collaborator (slightly uncomfortable, 3.30). Deleting another's song in oCreate_iAct (when the CP was created by another collaborator) was most uncomfortable (2.92), while deleting one's own song in iCreate_iAct was most comfortable (5.73). Overall, the highest level of comfort was for adding a song in iCreate_iAct (6.33). More nuanced results, separated by scenario, are conveyed in Fig. 2.

We also conducted thematic analysis on the reasons for hesitation in conducting CP actions (shown in Fig. 3); coding by two researchers yielded an acceptable level of agreement (Krippendorff's alpha = 0.87). These results closely align with what we found quantitatively in Fig. 2.

(Add song) We observed high levels of comfort in adding songs in all three scenarios, as shown in Fig. 2. The effect of scenario — that is, who created and who added to the playlist — was not significant in determining comfort in adding songs ($F(2, 297) = 0.995$; $p = 0.371$). Though minor, we see that participants are most comfortable adding songs to CPs they started themselves. Consistent

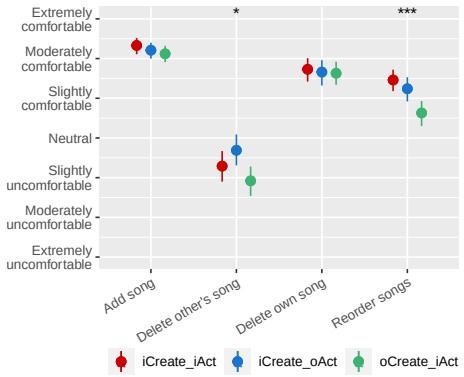

Fig. 2. Means of comfort in performing CP modifications, color-coded by scenario. Significance indicated is between scenarios.

Mentions of hesitation in general or CP actions

Scenario	No hesitation	Hesitation				
		Any	Add song	Reorder songs	Delete song	
					Own	Other's
iCreate_iAct	17%	66%	1%	10%	17%	58%
iCreate_oAct	16%	71%	2%	7%	21%	62%
oCreate_iAct	14%	73%	7%	12%	22%	60%

Fig. 3. Percentages of mentions of reasons for discomfort and hesitation (or lack thereof) in performing any action or specific CP actions separated by scenario, derived from thematic analysis of text responses. For example, in the oAct scenario, "delete own song" represents a collaborator deleting a song they added themselves, and "delete other's song" represents a collaborator deleting a song they did not add.

with these quantitative results, music added was perceived as *contributions* across all participants, and was positively regarded in most participants' text responses. Overall, 3% of responses indicated hesitation to add songs; most hesitation came from the oCreate_iAct scenario (7%).

- Not hesitant: *"Since it is collaborative, I think everybody should be able to add whatever song they want."* (P44)
- Hesitant: *"I sometimes get into my [own] head when I want to add songs thinking, 'Is this a good song to add to the playlist or should I just leave it out?' "* (P89)

(Delete other's song) Participants felt the greatest discomfort in deleting others' contributions; that is, deleting a song that someone else has added. Across all scenarios, deleting others' songs felt most uncomfortable, and this was the only action with a mean comfort value below neutral (Fig. 2). The influence of scenario on discomfort felt for this action was statistically significant ($F(2, 297) = 3.747$; $p < 0.05$). Across scenarios, more discomfort was experienced when deleting a friend's song in the oCreate scenario, while participants were slightly more generous about their friends deleting their songs (in oAct), though still below neutral. Open-ended responses (Fig. 3) also largely mentioned (58-62%) deleting someone else's songs. We expand upon this action in § 3.2.2 in greater detail.

(Delete own song) We found that overall, participants felt moderately comfortable deleting their own contributions. The influence of the scenario was not significant for this action ($F(2, 297) = 0.106$; $p = 0.899$). However, the comfort level for this action was slightly less than that of adding a song overall, and in conducting paired t-tests on only adding and deleting one's own songs, we found that the difference was statistically significant ($t(299) = 6.152$, $p < 0.001$).

Although fewer participants were worried about deleting their own songs than about deleting others', numerous participants felt that once a song has been added, the decision to delete it is no longer the adding contributor's to make (as evidenced by hesitation proportions of 17–22% in Fig. 2): *"I feel guilty that I may be deleting a song that other listeners love"* (P39). Such unwillingness to delete one's own songs showed consideration of others' enjoyment, as well as giving up a sense of individual ownership — or moving towards a perception of co-ownership — of a song once it had become part of a CP. Furthermore, the comfort for deleting own songs were similar to that of adding (Fig. 2), which underscores the nuanced variability in CP ownership. Ownership is discussed further in § 3.2.4.

(Reorder songs) As with adding and deleting one's own songs, participants felt comfortable reordering songs within CPs they had created, as opposed to within a CP created by a friend. The influence of scenario was statistically significant in reordering comfort ($F(2, 297) = 7.796$; $p < 0.001$). Interestingly, although the mean of the responses was above neutral (i.e., more on the comfortable side), participants were typically more comfortable with their friends reordering a playlist that they created (iCreate_oReorder) than they were reordering a playlist created by someone else (oCreate_iReorder).

We further inspected how each participant responded differently across scenarios. Close to 50% or more participants chose the same comfort level for adding and deleting songs (their own and others') in iCreate_iAct as they did in oCreate_iAct. This indicates that most participants had the same comfort level (either comfortable or uncomfortable) for these actions regardless of who started the playlist. However, in reordering, 51% of participants chose a greater comfort level for the iCreate_iAct scenario than they chose for oCreate_iAct. This asymmetry indicates that people tend to be more cautious with their own actions and more generous or lenient with their friends'. This may be due to the risk of not knowing the potential discrepancy between their own and their friends' perceptions of reordering, or due to a general sense of ownership of the playlist.

Similarly, participants' thoughts on reordering music varied in their text responses. While some regarded the order of songs in a CP as wholly unimportant, others felt that sequencing was important, and thus, reordering should be done with everyone's approval:

- Not hesitant: *"They can reorder anything. I think that is fine."* (P58)
- Hesitant: *"Songs should never be reordered ... Deleting or reordering songs that you haven't added to a collaborative playlist is an unspoken rule that should not be broken."* (P55)

This reflected two main perspectives on playlist order. For users who consider the order of songs in a playlist important, sequencing may define the relationship between songs and determine the whole narrative (whether aural or content-based) of the playlist.

3.2.2 ***Deleting others' songs is complicated.*** Consistent with quantitative comfort levels (from Fig. 2), deleting others' songs was clearly the most uncomfortable action based on text responses. Most did not want their songs to be deleted by others, nor did they want to delete others' contributions to a CP (Fig. 3). We further categorized the reasons for why people were hesitant in taking this particular action into themes, as this can help us understand the perceived barriers to co-curation.

The biggest reason for hesitation towards deletion was people's implication that it is against an underlying *social norm*; many perceived deleting a song added by someone else as being "rude": *"I would feel rude to delete someone else's pick"* (P62). Other labels applied to the action of deleting others' songs included *"mean"* (P96), *"wrong"* (P10), *"offensive"* (P3), and *"invasive"* (P22), among many others. These kinds of negative descriptors were mentioned in 34% of the text responses overall, most commonly in the oCreate_iAct (38%) and iCreate_iAct (37%) scenarios; the iCreate_oAct scenario had 28% mentions. The frequencies also show that with less ownership (i.e., in the oCreate case), there is greater fear of coming across this way.

To some, deleting was more than "rude". Deleting others' songs had a communicative undertone; it was *"insinuating"* (P33) poor taste in music: *"I would not want them to think I don't like their taste of music, or hurt their feelings"* (P7). Furthermore, P72 described that *"I would have no problem adding and deleting my own songs, because it is by my own volition,"* but that they would be hesitant to delete their collaborators' for fear of disagreement or *"strain on our friendship"* from such an inference. Similar sentiments were echoed in participants' reactions to having their own songs deleted: *"I would feel a bit offended and hurt if they deleted one of my additions"* (P23) and *"it would make me feel as though they don't appreciate my music taste or find it to be appalling"* (P72).

3.2.3 ***Opposing perspectives toward collaboration.*** We found that perceptions of the collaborative aspects of CPs can vary greatly. For example, not all simply felt negatively about deleting songs. Some participants were willing to accept deletions as part of collaboration, in spite of the negative sentiment they would feel towards them.

- *"If my friend deleted a song that is essential to the playlist, I would be a bit upset, but I would move on."* (P34)
- *"I am not sure I would want them deleting songs I added, but since it's a joint playlist I would be fine with it."* (P15)

Antithetically to the sentiments expressed above, some suggested that deleting songs in a CP would be *noncollaborative* as this action removes one's contributions:

- *"I'd be uncomfortable removing a song someone else added because I feel like the playlist is a group effort, and that was a part of their contribution."* (P10)
- *"I wouldn't have made this playlist collaborative if I didn't want other people to contribute songs that I may not like."* (P25)

A considerable number of participants (see "No Hesitation" column in Fig. 3) were also not hesitant in any of the actions, including deleting others' songs, as interacting through these actions is *"the purpose of a collaborative playlist"* (P18). For one, P8 stated: *"I did not hesitate for my friend to perform any of the actions [including deleting] to the collaborative playlist I started because I made the the playlist collaborative for those reasons. I welcome any suggestions they have regarding my playlist."* The same sentiment was echoed by P50: *"The list was created to be altered, I have no hesitations."*

Varied perceptions towards deletion can be a barrier in fluid collaboration, especially when CP collaborators have diverging perspectives. This would be challenging to be aware of without having collaborated for a long time or communicated explicitly. Otherwise, everyone would act cautiously and only add to the CP, given the lack of clear measure or goal to encourage or force curation.

3.2.4 ***Participants connoted and assumed ownership at varying levels (RQ1b).*** As seen in the previous section, the influence of the scenario (viz., who created the CP and who is taking an action) mattered significantly for reordering songs ($p < 0.001$) and deleting others' songs ($p < 0.05$). Across all actions, we observed a pattern of greater comfort in making modifications to self-created CPs (i.e., iCreate_iAct values (red) are higher than oCreate_iAct values (green) for all actions in Fig. 2). This effect was especially pronounced in the actions of deleting others' songs and reordering. Differing comfort levels, associated with who created the CPs, highlight the nuanced perceptions of ownership associated with each CP and the influence on users' interactions in the CP.

Text responses also reflected such different perceptions of CP ownership clearly. While we did not use the word "own", "ownership", or any possessive form in connection with CPs throughout the survey, merely describing how a playlist was first "started", participants recognized this as an indication of *ownership*. Words of ownership *did* occur in participants' responses to the question of whether they would have any hesitation towards modifying the CP for all three scenarios.

- iCreate_iAct: *"I feel as if I am ultimately in control of the playlist. I should be able to do whatever I please and not think twice about it."* (P8)
- iCreate_oAct: *"Since I started this playlist, I don't want them removing a song that I feel fits the playlist and that I like."* (P45)
- oCreate_iAct: *"I feel that the person that started the playlist has some type of ownership."* (P16)

Furthermore, because of this ownership, participants felt they were entitled to certain actions more than others were. However, not all participants felt the same way. Some participants felt that, by making a playlist *collaborative*, there was no longer sole ownership of it: *"By making the playlist collaborative, I consider it as having opened ownership of the list to everyone who contributes"* (P1).

Even though people tended to perceive playlists as being owned by their creators, some participants cared more about each song in the CP and who had made each contribution. For instance, participants felt more than moderately comfortable with adding songs to a playlist they did not start (oCreate_iAct). Similarly, participants were moderately comfortable with deleting their own songs from a CP they had contributed to. It seems that even if users add a song to someone else's CP, the song belongs to the one who added it more than it belongs to the person who created the CP. In the same vein, participants felt uncomfortable (below neutral) deleting songs that others had added, regardless of the scenario. This is consistent with the result that "delete own songs" was one of two actions in which the scenario did not have a statistically significant effect on comfort ($p = 0.899$). The following quotes exemplify this ownership per song:

- iCreate_iAct: *"Even if I created the playlist, who ever contributes should be the only ones to have the right to delete their added songs, unless first given permission."* (P43)
- oCreate_iAct: *"I feel fine doing things to my own songs — but I feel it might be rude to delete one my friend added."* (P51)

Both quantitative and qualitative results indicate that the ownership of songs seems to have more priority than ownership of the playlist.

To get a better sense of user groups with different sentiments toward CP actions across scenarios, which may account for the variance in the perception of ownership, we conducted *k*-means clustering (Fig. 4). The elbow method showed that two clusters would be optimal; therefore, we conducted clustering with two centers. The first two dimensions together explain 53% of the variance in participant responses. Inspecting the mean comfort levels among the two groups (see Fig. 5), Cluster 1 ($N = 67$) had lower comfort levels for deleting and reordering songs, but had slightly higher comfort in adding songs to CPs than did Cluster 2 ($N = 33$). Both groups of participants, for the most part, had above-neutral comfort levels, except in the case of deleting others' songs for Cluster 1. They also both showed a decreasing level of comfort for adding and reordering songs in the order of iCreate_iAct, iCreate_oAct, and oCreate_iAct. Participants who belonged to Cluster 2 felt slightly comfortable or above for all actions, indicating that the participants belonging to this cluster are less cautious about their actions than those in Cluster 1. On the other hand, the larger group of Cluster 1 seemed to have a sense of per-song ownership (deleting others' songs was moderately uncomfortable) as well as scenario-determined ownership (reordering was most uncomfortable in oCreate), indicating their discomfort in making changes to what they perceive as being others' songs and playlists. Particularly, we found that deleting others' contributions and reordering songs had the two greatest differences in means. We found that variance in perception of ownership exists not only in terms of strength (i.e., strong, weak) but also in terms of the owned unit (i.e., CP, song).

3.2.5 ***Ways to increase collaborators' comfort with CP modifications emerged.*** For each scenario, we asked participants, "What would have helped you feel more comfortable with performing these four actions (add song, delete song you added, delete song your collaborator added, and reorder songs) to the collaborative playlist [you have / your collaborator has] started?" We conducted thematic analysis on the text responses and three themes emerged. Two coders then coded the responses and yielded an acceptable level of agreement (Krippendorff's alpha = 0.90).
(Communicating to share thoughts) The most frequently mentioned way to help participants feel more comfortable about making CP modifications was *knowing* their collaborators' expectations for the CP (mentioned in 39% of responses). Knowing collaborators' thoughts could encompass what their friends expect from the CP (e.g., theme, mood), how they would like to manage it (e.g., how they would feel about specific actions), or simply how they liked their songs.

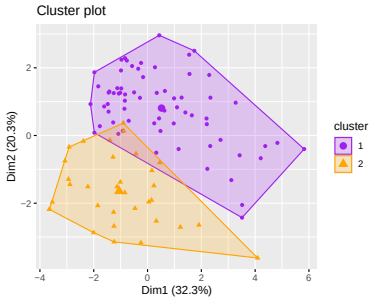

Fig. 4. Two k-means clusters from comfort level responses towards four actions in three CP scenarios.

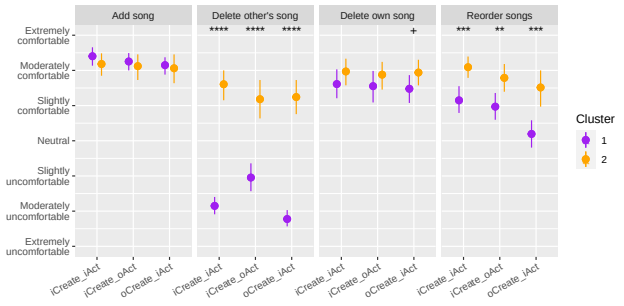

Fig. 5. Mean values of the two clusters from k-means clustering on four actions in three CP scenarios. Indicated significance is between clusters (Cluster 1: $N = 67$, Cluster 2: $N = 33$).

- Confirming CP theme: *"I want to my friend to let me know that I am following the theme of the playlist. There should be a way for my friend to message other contributors of the playlist if any of their changes are acceptable."* (P97)
- Articulating acceptable actions: *"I would feel more comfortable if there was a note or something from my friend saying it's okay to add or delete things."* (P23)
- Knowing usage and preference: *"I always wonder if it would bother her if I deleted songs off the list because I don't know what she thinks about that song"* (P63), *"[Show] song information leading to things like likes, views, shares."* (P64)

Overall, participants mostly agree that prior discussion and consistent feedback on songs, actions, and the playlist in general would help them be more comfortable collaborating. Unfortunately, the commercial platform we studied does not currently support such communication in any way.

(Getting permission) The second most prominent way to help collaborators feel more comfortable was receiving *permission* (mentioned in 28% of responses). This could be in the form of direct authorization from the contributor of a song or the "owner" of a CP, or through a group rating or voting system, whereby the "permission" would come from the group. Not only did participants mention they would feel more comfortable making CP modifications if they could receive permission, but they also would expect or would like others to do the same: *"At least, ask me before [deleting] each song and [...] if the reason makes sense, that would be much easier to stomach"* (P60).

(Being able to restore and undo) To a much lesser extent, in just 6% of responses, having a *historical record* of the CP emerged as a way to help collaborators feel more comfortable about making modifications. This included having the functionality to undo the changes made, revert the CP to saved instances, and keep a history of the CP: P35 desired *"a way to restore the playlist to its previous state"*, stating that *"if my friend didn't like what I did he/she could just revert the changes and then we can talk it out"*. Such statements highlight the need for features commonly used to raise asynchronous awareness [76].

These three ways — knowing collaborators' thoughts, receiving permission, and reverting changes — were not mutually exclusive, as responses sometimes contained one or more of these suggestions. Together, these three ways were mentioned in 69% of the responses. 7% of the responses indicated that "nothing" would make them more comfortable in taking actions. One participant gave a reflective response, stating that even though their negative feelings may not change towards CP modification, they were taking the modifications as an opportunity to practice acceptance: *"I'm using this as training for letting go and letting others. I am working on releasing my control and being open to how others do things"* (P53).

Overall, participants emphasized a need for functionality to communicate. Two coders also coded responses to an open-ended question on which method of communication they use, if they communicate with their CP collaborators; the codes yielded an acceptable level of agreement (Krippendorff's alpha = 0.99). Only eleven participants marked "N/A" or did not respond, suggesting that they would not communicate. The remaining 89% of the respondents communicated with their collaborators; many mentioned more than one channel of communication, leading to an average of 1.47 channels of communication (with a maximum of four). 77% mentioned that they communicated through text-based messaging (e.g., Facebook Messenger, WhatsApp, text messages), 15% mentioned calling or video conferencing (i.e., remote communication with audio), and 25% mentioned communicating in person.

4 STUDY 2: VALUE OF A COMMUNICATION CHANNEL IN CP ON USER COMFORT

Study 2 aims to answer our questions about a communication channel's role in a CP; specifically, how it may impact users' comfort with actions, given the discomfort found in various CP scenarios through Study 1. As an extension of Study 1, we designed Study 2 with a focus on communication while walking the participants through each scenario and the actions they would take [66].

4.1 Method

The survey consisted of walkthroughs presented before asking whether the communication channel could ameliorate discomfort.

4.1.1 Experimental interface. For the walkthroughs, we prototyped various "looks-like prototype" [31, 32] interfaces that matched the content and presentation style of information displayed in Spotify's CPs. We designed these interfaces to include communication channels based on the display techniques of workspace awareness [27]. This resulted in four interfaces with differing placement and presentation. According to Gutwin and Greenberg, the *placement* of the information displayed can be either *situated* within the workspace or *separate* from it, and the *presentation* can be either *literal* or *symbolic*. For CPs, *situated* was interpreted as being co-located with the individual songs, as these were the elements within the CP that collaborators were interacting with; *separate* was interpreted as being on the side, not co-located with individual songs, but within the same view or "page" as the CP. For *literal*, we used text-based communication; we effected *symbolic* communication by extracting the content that the literal communication conveyed into a symbolic representation (e.g., emoticons, icons).

To decide which design of the mock interface we would use for Study 2, we garnered evaluations from Study 1 participants, who had thought through various CP scenarios, at the end of the survey. In particular, we asked the participants to rank the interfaces (1 through 4) based on which one they liked the most ("preference") and which they thought they would use the most ("projected usage"). Separate_Literal had the highest mean ranks (average rank of preference at 2.19, projected usage at 2.23), closely followed by Situated_Literal (preference at 2.33, projected usage at 2.32). The overall result indicated that the participants preferred the Separate_Literal interface, in which the communication channel was separate from the list and they could communicate more directly. Hence, we chose to use this particular design in Study 2 for further analysis.

4.1.2 ***Embedded scenario interactions.*** Building upon the findings from Study 1, we further explored the scenarios iCreate_iAct and oCreate_iAct. Doing so led us to better understand the differences in the participant acting upon the two slightly different CPs — one created by the participant, and another one created by the participant's potential collaborator.

For this, we first provided three different CPs for participants to choose from, based on how well they could envision collaborating on the CP given the selection of songs.

We presented all of our mock CPs in the format of the Separate_Literal interface (hereinafter, simply "communication interface"), which we found to be most promising in Study 1 (example shown in Fig. 6). To better situate the participants, we asked participants to engage in mock interactions based upon the CP of their choice with respect to the songs contained in, and the functionality of, the CP as indicated by the CP's title. These mock interactions were created by asking participants to identify songs they wished to add and delete from the playlist, as well as to provide a list of songs from their chosen CPs that they could reorder. After each mock interaction, we asked for their comfort levels with performing each action, and also asked whether they would want to communicate with their collaborators about the action they took. The questions were posed with the same 7-point Likert scale as described in § 3.1.1. At the end of each scenario, we asked whether their comfort levels would change based on the ability to communicate about their actions on a 5-point Likert scale from much more uncomfortable (1) to much more comfortable (5). We chose a 5-point Likert scale for this question because too much granularity in detecting changes could have made it difficult for our participants to choose a response. This was suitable for our goal of understanding whether the communication channel provides a positive or negative change in comfort. After interacting with the mock communication interface, we asked the participants to evaluate the interface using a selection of attributes that were inspired by the heuristic evaluation proposed by Nielsen and Molich [52]. We selected four of the nine attributes, and also added attributes relating to collaboration and satisfaction, resulting in a total of seven attributes: memorable, satisfying, error-tolerant, effective for communication, helpful to collaborator dynamics, efficient/convenient, and easy to learn.

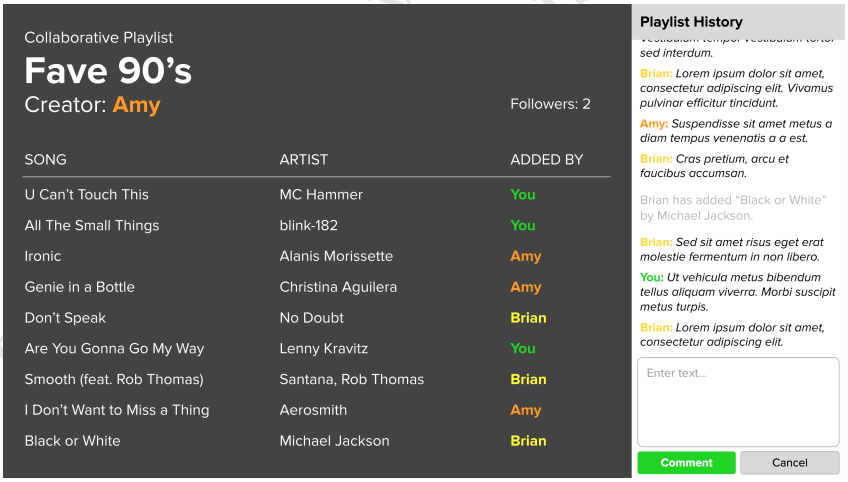

Fig. 6. An example of the communication interface (Separate_Literal) that participants interacted with. This particular interface is of a CP named "Fave 90's" chosen by 60% of participants as being the CP they could imagine collaborating on. This CP is an example of the oCreate_iAct scenario with three collaborators: Amy ("Creator"), Brian, and the participant ("You"). Playlist History captures dialogue between collaborators, generated using the chat box, as well as status updates (e.g., addition of a song in light gray font). For the playlist history, we included Lorem Ipsum placeholder text (in black font) and explained to the participants that we did this to avoid biasing them as to the kinds of conversations that would be going on in the CP.

4.1.3 ***Questionnaire design.*** The design of the questionnaire for Study 2 was similar to that of Study 1, as described in § 3.1.2. In addition to the eligibility criteria for Study 1, for Study 2, we ensured those who had already participated in Study 1 were not eligible, in order to eliminate any

bias from previous participation. Study 2 consisted of questions regarding a probable CP, mock interactions with the chosen CP, and interface evaluations. In Study 2, the actions and scenarios were both randomized and evenly presented, such that no ordering effects would take place. Data analysis was conducted similarly as in Study 1, as presented in § 3.1.3.

4.1.4 ***Participant demographics.*** We recruited $N = 91$ participants on MTurk and garnered $N = 73$ responses (80%) from participants who had interacted with CPs in some capacity before (i.e., CP users) and could imagine collaborating with others on their selected CP. Filtering out participant data based on irrelevant text responses to a manipulation check and unusually rapid survey completion ($N = 23$) led to $N = 67$ full participant responses. 47.8% had created CPs, 82.1% had listened to CPs created by others, and 58.2% had listened to CPs created by themselves as well as contributed to CPs. 65.7% engaged with CPs a few times per year to at least once per month, whereas 34.3% did so at least once per week or at least once per day. Spotify was the dominant platform used to participate in collaborative playlists (70.1%). 46% of our participants were female, and 90% of our participants were 25–54 years old.

4.2 Results

We present results regarding perceptions of the four CP actions from mock interactions in two scenarios: iCreate_iAct and oCreate_iAct. We also present participants' perceptions of the communication interface situated within the CPs after these mock interactions. Comfort levels expressed for four actions in two scenarios were found to be similar to those found in Study 1; t-tests comparing the means of responses from Studies 1 and 2 were not found to be significant ($p > 0.1$ in all cases). Consistent with Fig. 2, we found that oCreate_iAct actions were all less comfortable for participants than the same actions in iCreate_iAct (RQ1a). In terms of CP actions, the greatest difference between comfort levels was detected in reordering songs in the playlist (RQ1b). Further analysis showed that the comfort level associated with reordering was significant between scenarios ($p < 0.01$, ANOVA). We also found the scenario to have a marginally significant effect on the comfort of adding songs ($p < 0.1$, ANOVA).

4.2.1 ***Desire for communication.*** Before engaging in mock interactions with their CP collaborators, participants indicated whether they wanted to communicate with others about each of their actions. We found an overall desire to communicate with collaborators, and we found that

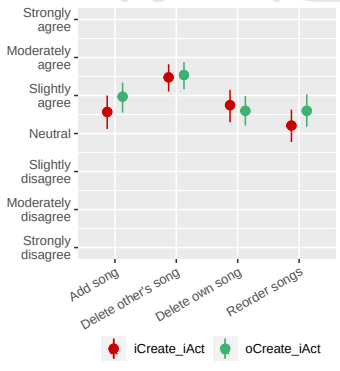

Fig. 7. Communication desire for each action and scenario after mock interactions. No significance was found between scenarios.

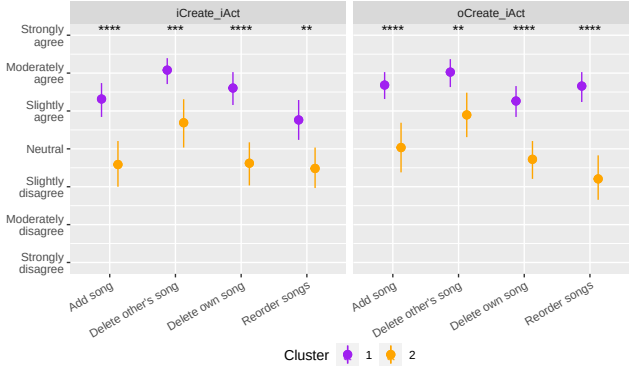

Fig. 8. Communication desire for each action and scenario, separated by two clusters from k-means clustering of this data (Cluster 1: $N = 38$, Cluster2: $N = 29$). Indicated significance is between clusters.

the desire to communicate was greatest when deleting others' contributions in both the iCreate and oCreate scenarios (Fig. 7). The remaining actions were between slightly agree and neutral, indicating a slight desire to communicate about the action being taken on the CP.

Observing patterns in participants' answers, we conducted k-means clustering and found two clusters emerging (Fig. 8). Cluster 1 ($N = 38$, more than half the participants) desired to communicate in tandem with their action for all four actions across two scenarios. Meanwhile, participants in Cluster 2 ($N = 29$) were varied in desiring communication, averaging between slightly disagree and neutral, except when deleting songs that their collaborators added. The greatest deviance between the two clusters was found in their desire to communicate about reordering songs.

4.2.2 ***Influence of a communication channel on comfort level.*** In addressing RQ2 using mock interfaces, we found that on average, having a communication channel — which, in our case, was a Separate_Literal interface — made our participants slightly more comfortable overall, except for when deleting another's song. Analyzing these results with more granularity, we found that the comfort level of deleting others' contributions averaged around "no change at all" for both scenarios. However, comfort levels for all other actions were higher and leaned towards "slightly more comfortable" (Fig. 9). Analysis of change in comfort level for each action showed no significant difference between the two scenarios.

Upon plotting individual changes in comfort levels, we found a pattern emerging which cannot be accounted for with the overall averages, and therefore conducted k-means clustering based on the relative change values. Using the elbow method, we found three clusters to be the most appropriate. The three groups showed distinct patterns in their change in comfort with the added communication channel (Fig. 10). Cluster 1 ($N = 29$) perceived they would be slightly more comfortable or above for all actions regardless of scenario, with slightly higher comfort in deleting others' songs. Cluster 2 ($N = 23$) perceived minimal comfort changes (slightly above and below no change at all in comfort level) for all actions except for deleting others' songs. For deleting others' songs, Cluster 2 expected to be slightly more uncomfortable when having a communication channel. Cluster 3 ($N = 15$) perceived mixed changes in comfort. Like Cluster 1, those in Cluster 3 felt more comfortable in adding songs and deleting their own songs with a communication channel. However, Cluster 3 tended more towards Cluster 2 with regards to their change in comfort in deleting others' songs. It

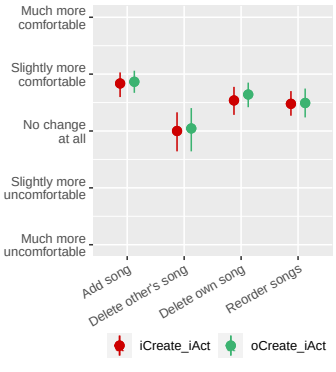

Fig. 9. Change in comfort levels with a communication channel present. No significance was found between scenarios.

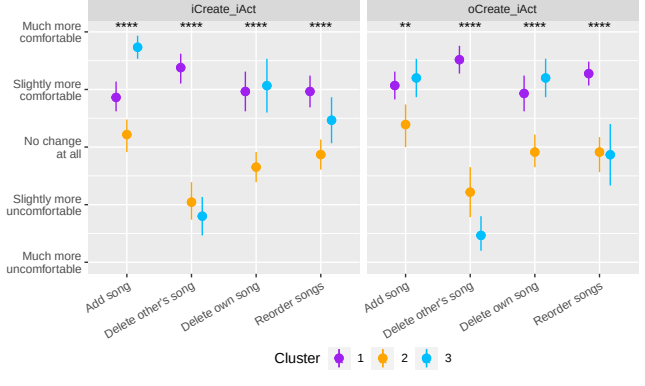

Fig. 10. Change in comfort levels with a communication channel present for each action and scenario, separated by three clusters from k-means clustering of this data (Cluster 1: $N = 29$, Cluster2: $N = 23$, Cluster 3: $N = 15$). Indicated significance is between clusters.

is interesting to note that the communication channel had both positive and negative effects for the deletion action, and that a greater number of people felt more uncomfortable about communicating about their "deleting others' " action, despite the average centering around "no change at all" for all participants.

5 DISCUSSION

Our results have shown divergent and nuanced perspectives toward CP actions, and that users' comfort in collaborative engagement changes significantly between types of actions and scenarios, and based on the presence or absence of a channel for communication. From these, we propose four design considerations for CP designs that can inform future technologies for social co-curation.

5.1 Collaborators may have conflicting views on CP ownership

Ownership towards the immaterial (i.e., digital) [62] was evident in the CP context. Two types of ownership emerged — *individual* and *group* — which were also identified from participants' perspectives in a collaborative writing study [8]. Through the various scenarios, however, we were able to distinguish between two kinds of individual ownership: one associated with the participant themselves and one associated with another collaborator. Individual ownership associated with another collaborator indicated either the participant's mindset (e.g., *"I feel that the person that started the playlist has some type of ownership"* (P16)) or a projection of the collaborator's mindset (e.g., *"They might feel a sense of ownership"* (P42)). Some also displayed group ownership, or equal ownership amongst collaborators: *"joint playlist"* (P15).

Further, we found that for both individual and group ownership, the object of ownership could be either songs in the CP or the CP itself — *constituent* and *aggregate* — with stronger evidence for the former (a kind of singular ownership per added song). The differences in how participants perceived these ownership structures were further exemplified through the deviance observed between clusters (in Figs. 5 and 10).

These differences in perception of ownership can pose a threat to collaboration. One collaborator may boldly delete songs in a CP they have created, while other collaborators may have expected everyone to only add songs. Here, the first collaborator's actions could be misconstrued as a display of "possessive rituals" to others, as was the case on Pinterest [69]. Similarly, if one feels that the songs are owned equally by everyone contributing to the CP and reorders the playlist, another collaborator might see this action as stepping on their territory. This may even lead to displaying territoriality [77] and can discourage contributions and collaborations. While territoriality could be highly useful in creating a CP of quality — as it has been in the context of Wikipedia [77] — its consequences within a creative context amongst collaborating friends can be detrimental. Expecting individual CP ownership toward the other playlist creator (i.e., oCreate) can also lead to seemingly passive collaboration from other collaborators: *"Since my friend started the playlist, I would feel like I was imposing or being a bit presumptuous in some of these cases"* (P57). This could also be unfavorable to those starting a CP in the hopes of receiving active contributions, which many participants mentioned as being the reason for making a playlist collaborative [58]. Therefore, it is critical to help users collaborating on CPs to find common ground [17] as to their expected ownership structures, since the data shows that ownership is not always (implicitly) assigned to the one who started the CP or the one who added a song. To do so, such questions as "Can CP functionalities be designed in a way such that everyone can learn their peer's perceived ownership and the potential discrepancy?" may be useful.

Furthermore, collaborators may all *desire* co-ownership of the CP, even if they *expect* individual CP ownership. Friends engaged in storytelling together were found to prefer equal division of power [40], and this equality in group ownership may be desired for CPs as well. In fact, just as "role

in structures and concomitant power differentials" [80] was one of the four reasons for not wanting to co-write, this could be the outcome of maintaining individual ownership in CPs, deterring users from collaborating further. Hence, in addition to understanding whether collaborators have different ownership expectations, applications can help to mediate user interactions such that users can reach their collectively desired type of ownership. Design of CP functionalities can be more mindful of how explicit cues of identity are displayed [13] and consider ways to support users who may be *"training for letting go and letting others"* as expressed by P53. Moreover, the nuanced ways in which concepts of ownership can arise and hinder collaboration, the very activity that the platform aims to encourage, ought to be noted.

5.2 Some actions speak louder than others and turn CPs into laundry lists

As evidenced in both Studies 1 and 2, the four actions that our participants evaluated all differed in terms of comfort: overall means of actions ranged from 3.30 (above slightly uncomfortable) to 6.22 (above moderately comfortable), a range that is almost half the range of our 7-point Likert scale. These actions were also found to be felt differently across the three CP scenarios, and the variance was even more pronounced (from 2.92 to 6.33).

Inspecting text responses, we found adding songs was perceived mostly as a contribution to the CP — seen as being additive and positive — with only 3% of responses indicating hesitation to do so. Conversely, any discomfort expressed was due to the negative communicability of some of their actions. Out of all the actions, deleting others' songs was the most uncomfortable. We found deleting a song that one has not added to the CP oneself communicates the most negative message (and thus, the "loudest" action) to other collaborators. Prior work found that some CPs were used to keep a record of all the songs shared amongst the collaborators, while some were used as a playlist for all to listen to the most recent songs [57, 58]. The latter entailed limiting the number of songs contained in the playlist, thereby operating under the premise of deleting songs. If such decisions around the CP had been articulated when the collaboration was instantiated, or if the application had an option for users to specify a song limit, perhaps the hesitation towards deleting songs would not have been as apparent as was found in our study; deleting a song would be a natural course of action as someone adds a song. Alternatively, the constraint could even encourage further discussions around music and create additional CPs among collaborators. In doing so, collaborators can be certain that the intention behind deleting is not to insinuate that another contributor has bad taste in music, and could thereby feel less negativity towards deletions. This is analogous to multiple authors writing an article with a firm length limit (e.g., a conference paper with a requirement of 10 pages or fewer) that leads the authors to discuss and weigh in on what should go and stay [54].

Parsing out the meanings that users associate with their own and others' actions is important. This communicability may be inherent in the platform, but can also stem from users assigning a "communication function" to "simple tools" [33], as with CP actions. For example, researchers have found that the action of "liking" on Facebook is prompted by sensory and visual features [38] and motivated by content- and relationally-based meanings [75]. Further investigations that lead to building a more nuanced understanding of the thought process behind collaborative actions, with consideration of different possible scenarios of collaboration, will be critical.

5.3 Performing an "invasive" action is uncomfortable, more so than receiving it

Participants' text responses revealed how they would expect others to act, and this mirrored what they thought they would do or like being done to them (e.g., some would not delete others' contributions because they would not like their own songs to be deleted by others); this could be an instance of "moral behavior" promoted by imagining oneself in the other's place [2, 43]. Despite the mirrored expectations, we found prominent differences between deletion of one's

own contributions versus that of others' contributions: while deleting one's own contributions averaged around moderately comfortable, deletion of others' contributions averaged at slightly uncomfortable (Fig. 2). We also found differences in comfort for deleting others' contributions between iCreate_oAct and oCreate_iAct, where the roles of creating and acting upon the CP are flipped. There was less discomfort in others deleting a song that the participant had added compared to the participant deleting a song that another collaborator had added. This shows that participants are more hesitant to carry out "invasive" actions than to receive them, and this may be a result of being conflict-averse (and thus not wanting to create any reason for conflict). This is important to note because such conflict aversion can lead to less participation [79], and this can discourage CP involvement. Furthermore, if there is a song that someone wants deleted, and yet it remains in the CP, the CP can only be less than ideal for that collaborator. While some may be happy to skip the song, others may not be as willing, especially if there are too many songs to skip. Therefore, mitigating the uncertainty in how deleting songs is perceived is important to CP engagement.

5.4 Communication channels for CPs can ease discomfort around CP actions

Notably, *"having a prior discussion"* (P4) and negotiation before making decisions helped users to feel more at ease with CP actions. Such accounts from many CP users suggest that this ensuing ease may be the reason for direct communication beyond the CP platform, which does not itself support any communication. Even so, such discussions situated outside of the CP may pose difficulties to users, as the conversational context may be missing. Additionally, switching between platforms can be inconvenient, becoming a hindrance to communication itself. Participants may also feel more comfort in scenarios where they may not feel ownership of the CP (i.e., attribute CP ownership to other collaborators) with communication, as implied by a greater desire for communication in most actions for the oAct scenario (Fig. 7). These results underscore the finding that sharing, of music in our case, "depends a lot on feelings for the other and on the other's concern for oneself" [16]. As implemented in various systems (e.g., the commenting feature in Google Docs), contextualized in situ communication can be helpful and desirable, and can encourage greater participatory culture [15, 34, 81]. Therefore, situating such discussions within the CP would enable more active communication around the music users wish to include or exclude from the CP, and could facilitate even more sharing of songs and musical tastes.

While some CP users took to other means to communicate directly, it was evident that this was not always the case — some did not always communicate, and some not at all. Perhaps the users who did not communicate were not so comfortable doing so, as was the case with Cluster 1 in Fig. 5. Communicating about the changes makes them more apparent, even when users have no desire to draw attention to the modifications they are making: *"hoping they don't notice I got rid of one of theirs"* (P27). Here, technological mediation can be effective — an intelligent agent that offers to delete a song that is no longer enjoyed by the collaborators and obsolete in the CP could be one way of facilitating communication to address this discomfort. Providing avenues for greater awareness can also help to ease communication.

Participants indicated a general lack of awareness of how others felt about the music in the CPs — awareness of both the *changes made* in the CP and *collaborators' sentiments* regarding the music. Those hesitant to communicate altogether may benefit from features that raise awareness of individual CP usage (e.g., play counts [35]) and modifications (through mechanisms for change awareness [76]) , which could subsequently supply topics for communication. P30 expected others to "reprimand" them for adding songs other collaborators dislike, and suggested a need for prior notifications (i.e., a way to enhance change awareness) to take CP actions with greater comfort.

Lacking awareness of collaborators' sentiments was also a hindrance to fluid collaboration. Many users did not want to risk the chance of deleting a song that others "may like", especially

because sentiments are dynamic (e.g., one may get tired of a song after months of consumption). Moreover, knowing their collaborators' thoughts and expectations for a CP was the most frequently mentioned (39%) way to help participants feel more comfortable about making CP modifications. These highlight the frustrating opacity of individual sentiments, and also the potential differences in collaborators' sentiments. Awareness of whether another person is enjoying a song or not, which can be achieved through explicit means (e.g., discussions) and implicit means (e.g., sentiment reactions [78]) or greater platform transparency, is needed to take CP actions comfortably.

Communication can help resolve these issues of awareness as well. Consistent with prior work in co-writing [7] and co-creation [49], in which communication was found to be vital to collaborative success, users in Study 1 evaluated the literal interfaces as being most preferable. We can attribute this to the literal interface's affordance for communication in a variety of forms: a Situated_Literal interface affords rich conversations around specific songs, whereas a Separate_Literal interface facilitates profuse communication on the CP as a whole as well as general music sentiments. This suggests that in the context of CPs, which many users collaborate on asynchronously, more communication may lead to positive impressions of their collaborators, unlike the relationship found in co-writing [8], where more communication led to more negative impressions. Or, as collaborators are most often friends, this relationship or expectation of communication may be different in CPs. Hence, enabling communication on the CP platform itself is promising for active and more comfortable collaborations, and ought to be investigated further.

6 LIMITATIONS & FUTURE WORK

Our studies were conducted using surveys. While this has the benefit of collecting numerous responses from multiple users, and is a commonly used method for testing scenarios, we were not able to garner perceptions and interactions around real CPs that have been built between collaborators over time. In the same vein, hypothetical scenarios may not accurately represent participants' real experiences collaborating on real CPs, and their responses to these scenarios may be speculative. Therefore, we aim to continue this work to test our findings through in-the-wild experiments that allow for greater ecological validity. While we used the Situated_Literal interface for Study 2, both literal interfaces were both found to be promising from Study 1; therefore, understanding which interface is of greater support to CPs will require further investigation. In furthering this work with ecologically valid interactions, we will be able to compare promising interfaces with greater accuracy. In conducting these future investigations, we will also use semi-structured interviews and direct observations to glean rich anecdotal information and behavioral measurements, to further elucidate perceptions and interactions around CPs.

7 CONCLUSION

Examining the current rendition of CPs exemplified by Spotify, we studied how comfortable participants felt with taking CP actions (adding, deleting, and reordering songs) in three scenarios based on who started the CP and who was taking action on it. In investigating users' comfort with each action and scenario, we found that some actions were more uncomfortable than others and also found that who initiated the CP and who contributed a given song influenced their comfort. Moreover, we found that communication was desired and helpful in CP interactions; participants desired the ability to communicate more for certain actions than others. Through mock interactions using a Separate_Literal interface with a communication channel, we determined that this interface fostered further collaboration and promoted effective communication. From these results, we derived four design considerations around ambiguous ownership expectations, differing perceived magnitudes of actions, leniency in taking more "invasive" actions, and the potential for communication to ease discomfort in CP interactions.

The simple act of curating a music playlist can entail rich social dynamics intertwined with ownership (territoriality), discomfort, and a desire for further communication. With a more nuanced understanding of users in various collaborative contexts, in which goals, expectations, and perceived ownership differ, we will be able to design more suitable and user-centered tools for social collaborations, starting with CPs. This will enable more diverse and vibrant collaborations between users, and it will present more opportunities for further research into collaborator dynamics.

ACKNOWLEDGMENTS

We thank the MTurk workers for their participation; Larry Leifer, Mathieu Le Goc, Noam Bendelac, and reviewers for their invaluable feedback; and Hongchan Choi for making this collaboration happen.

REFERENCES

[1] Michael Allison. July 21, 2020. Google Adds Collaborative Playlists to YouTube Music. https://www.androidcentral.com/youtube-music-tests-collaborative-playlists, Accessed September 27, 2020.

[2] C Daniel Batson, David A Lishner, Amy Carpenter, Luis Dulin, Sanna Harjusola-Webb, Eric L Stocks, Shawna Gale, Omar Hassan, and Brenda Sampat. 2003. "... As You would Have Them Do Unto You": Does Imagining Yourself in the Other's Place Stimulate Moral Action? *Personality and Social Psychology Bulletin* 29, 9 (2003), 1190–1201.

[3] Stephan Baumann, Björn Jung, Arianna Bassoli, and Martin Wisniowski. 2007. BluetunA: Let Your Neighbour Know What Music You L. In *CHI'07 Extended Abstracts on Human Factors in Computing Systems*. ACM, 1941–1946.

[4] Weston L Baxter, Marco Aurisicchio, and Peter RN Childs. 2015. A Psychological Ownership Approach to Designing Object Attachment. *Journal of Engineering Design* 26, 4-6 (2015), 140–156.

[5] Eevi E Beck and Victoria ME Bellotti. 1993. Informed Opportunism as Strategy: Supporting Coordination in Distributed Collaborative Writing. In *Proceedings of the Third European Conference on Computer-Supported Cooperative Work 13–17 September 1993, Milan, Italy (ECSCW)*. Springer, 233–248.

[6] Russell W Belk. 1988. Possessions and the Extended Self. *Journal of Consumer Research* 15, 2 (1988), 139–168.

[7] Jeremy Birnholtz and Steven Ibara. 2012. Tracking Changes in Collaborative Writing: Edits, Visibility and Group Maintenance. In *Proceedings of the ACM 2012 Conference on Computer-Supported Cooperative Work & Social Computing (CSCW)*. 809–818.

[8] Jeremy Birnholtz, Stephanie Steinhardt, and Antonella Pavese. 2013. Write Here, Write Now! An Experimental Study of Group Maintenance in Collaborative Writing. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 961–970.

[9] Ina Blau and Avner Caspi. 2009. What Type of Collaboration Helps? Psychological Ownership, Perceived Learning and Outcome Quality of Collaboration Using Google Docs. In *Proceedings of the Chais Conference on Instructional Technologies Research*, Vol. 12. 48–55.

[10] Barry Brown and Abigail Sellen. 2006. Sharing and Listening to Music. In *Consuming Music Together*. Springer, 37–56.

[11] Barry Brown, Abigail J. Sellen, and Erik Geelhoed. 2001. Music Sharing as a Computer Supported Collaborative Application. In *Proceedings of the European Conference on Computer-Supported Cooperative Work (ECSCW) 2001*. Springer, 179–198.

[12] GF Brown. 1995. Factors that Facilitate or Inhibit Interprofessional Collaboration. In *17th Annual Interdisciplinary Health Care Team Conference. Pittsburgh, PA*.

[13] Nick Bryan-Kinns, Patrick G. T. Healey, and Joe Leach. 2007. Exploring Mutual Engagement in Creative Collaborations. In *Proceedings of the 6th ACM SIGCHI Conference on Creativity & Cognition* (Washington, DC, USA) *(C&C '07)*. Association for Computing Machinery, New York, NY, USA, 223–232. https://doi.org/10.1145/1254960.1254991

[14] John M Carroll. 2000. *Making Use: Scenario-Based Design of Human-Computer Interactions*. MIT press.

[15] Clement Chau. 2010. YouTube as a Participatory Culture. *New Directions for Youth Development* 2010, 128 (2010), 65–74.

[16] Roy YJ Chua, Michael W Morris, and Shira Mor. 2012. Collaborating Across Cultures: Cultural Metacognition and Affect-Based Trust in Creative Collaboration. *Organizational Behavior and Human Decision Processes* 118, 2 (2012), 116–131.

[17] Herbert H Clark and Susan E Brennan. 1991. Grounding in Communication. (1991).

[18] Mihaly Csikszentmihalyi and Eugene Halton. 1981. *The Meaning of Things: Domestic symbols and the self*. Cambridge University Press.

[19] Janice Denegri-Knott and Mike Molesworth. 2010. Concepts and Practices of Digital Virtual Consumption. *Consumption, Markets and Culture* 13, 2 (2010), 109–132.

[20] Jack Denton. May 7, 2020. Bring Back Turntable.fm. https://www.vice.com/en_us/article/pkyepn/bring-back-turntablefm, Accessed September 27, 2020.
[21] Helga Dittmar. 1992. *The Social Psychology of Material Possessions: To Have is to Be.* Harvester Wheatsheaf and St. Martin's Press.
[22] A. Dix. 1994. *Computer Supported Cooperative Work: A Framework.* Springer London, London, 9–26. https://doi.org/10.1007/978-1-4471-2029-2_2
[23] Nicolas Ducheneaut and Robert J Moore. 2005. More Than Just 'XP': Learning Social Skills in Massively Multiplayer Online Games. *Interactive Technology and Smart Education* (2005).
[24] Kim Gilmour. 2011. Collaborate on Playlists with Spotify's Collaboration Feature. (2011). http://bit.ly/2tgITmm, Accessed April 8, 2019.
[25] Kentaro Go and John M Carroll. 2004. The Blind Men and the Elephant: Views of Scenario-Based System Design. *Interactions* 11, 6 (2004), 44–53.
[26] Max Goldman, Greg Little, and Robert C Miller. 2011. Real-Time Collaborative Coding in a Web IDE. In *Proceedings of the 24th Annual ACM Symposium on User Interface Software and Technology*. 155–164.
[27] Carl Gutwin and Saul Greenberg. 2002. A Descriptive Framework of Workspace Awareness for Real-Time Groupware. *Computer-Supported Cooperative Work & Social Computing (CSCW)* 11, 3 (01 Sep 2002), 411–446. https://doi.org/10.1023/A:1021271517844
[28] Aaron Halfaker, Aniket Kittur, Robert Kraut, and John Riedl. 2009. A Jury of Your Peers: Quality, Experience and Ownership in Wikipedia. In *Proceedings of the 5th International Symposium on Wikis and Open Collaboration*. 1–10.
[29] Catherine Hall and Michael Zarro. 2012. Social Curation on the Website Pinterest. com. *Proceedings of the American Society for Information Science and Technology* 49, 1 (2012), 1–9.
[30] David J. Hargreaves and Adrian C. North. 1999. The Functions of Music in Everyday Life: Redefining the Social in Music Psychology. *Psychology of Music* 27, 1 (1999), 71–83.
[31] Björn Hartmann, Scott R Klemmer, and Michael Bernstein. 2005. d. tools: Integrated Prototyping for Physical Interaction Design. *IEEE Pervasive Computing* 4 (2005).
[32] Björn Hartmann, Scott R Klemmer, Michael Bernstein, Leith Abdulla, Brandon Burr, Avi Robinson-Mosher, and Jennifer Gee. 2006. Reflective Physical Prototyping Through Integrated Design, Test, and Analysis. In *Proceedings of the 19th Annual ACM Symposium on User Interface Software and Technology*. 299–308.
[33] Rebecca A Hayes, Caleb T Carr, and Donghee Yvette Wohn. 2016. One Click, Many Meanings: Interpreting Paralinguistic Digital Affordances in Social Media. *Journal of Broadcasting & Electronic Media* 60, 1 (2016), 171–187.
[34] Claudia Iacob. 2011. Identifying, Relating, and Evaluating Design Patterns for the Design of Software for Synchronous Collaboration. In *Proceedings of the 3rd ACM SIGCHI Symposium on Engineering Interactive Computing Systems*. 323–326.
[35] Gawesh Jawaheer, Martin Szomszor, and Patty Kostkova. 2010. Comparison of Implicit and Explicit Feedback From an Online Music Recommendation Service. In *Proceedings of the 1st International Workshop on Information Heterogeneity and Fusion in Recommender Systems*. 47–51.
[36] Alboukadel Kassambara. 2018. *ggpubr: 'ggplot2' Based Publication Ready Plots.* https://CRAN.R-project.org/package=ggpubr R package version 0.2.
[37] Alboukadel Kassambara and Fabian Mundt. 2017. *factoextra: Extract and Visualize the Results of Multivariate Data Analyses.* https://CRAN.R-project.org/package=factoextra R package version 1.0.5.
[38] Cheonsoo Kim and Sung-Un Yang. 2017. Like, Comment, and Share on Facebook: How Each Behavior Differs from the Other. *Public Relations Review* 43, 2 (2017), 441–449.
[39] Joy Kim, Maneesh Agrawala, and Michael S Bernstein. 2017. Mosaic: Designing Online Creative Communities for Sharing Works-in-Progress. In *Proceedings of the 2017 ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW)*. 246–258.
[40] Joy Kim, Justin Cheng, and Michael S Bernstein. 2014. Ensemble: Exploring Complementary Strengths of Leaders and Crowds in Creative Collaboration. In *Proceedings of the 17th ACM conference on Computer-Supported Cooperative Work & Social Computing (CSCW)*. 745–755.
[41] Joy Kim, Sarah Sterman, Allegra Argent Beal Cohen, and Michael S Bernstein. 2017. Mechanical Novel: Crowdsourcing Complex Work Through Reflection and Revision. In *Proceedings of the 2017 ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW)*. 233–245.
[42] David S Kirk, Abigail Durrant, Gavin Wood, Tuck Wah Leong, and Peter Wright. 2016. Understanding the Sociality of Experience in Mobile Music Listening with Pocketsong. In *Proceedings of the 2016 ACM Conference on Designing Interactive Systems*. 50–61.
[43] Lawrence Kohlberg. 1976. Moral Stages and Moralization. *Moral Development and Behavior* (1976), 31–53.
[44] Jumin Lee and Ayoung Suh. 2015. How Do Virtual Community Members Develop Psychological Ownership and What are the Effects of Psychological Ownership in Virtual Communities? *Computers in Human Behavior* 45 (2015), 382–391.

[45] Sang Won Lee, Yujin Zhang, Isabelle Wong, Yiwei Yang, Stephanie D O'Keefe, and Walter S Lasecki. 2017. Sketchexpress: Remixing Animations for More Effective Crowd-Powered Prototyping of Interactive Interfaces. In *Proceedings of the 30th Annual ACM Symposium on User Interface Software and Technology*. 817–828.

[46] Arto Lehtiniemi, Jarno Ojala, and Kaisa Väänänen. 2017. Socially Augmented Music Discovery with Collaborative Playlists and Mood Pictures. *Interacting with Computers* 29, 3 (2017), 416–437.

[47] KuanTing Liu and Roger Andersson Reimer. 2008. Social Playlist: Enabling Touch Points and Enriching Ongoing Relationships Through Collaborative Mobile Music Listening. In *Proceedings of the 10th international Conference on Human Computer Interaction with Mobile Devices and Services*. ACM, 403–406.

[48] Debora Lui. 2015. Public Curation and Private Collection: The Production of Knowledge on Pinterest.com. *Critical Studies in Media Communication* 32, 2 (2015), 128–142.

[49] Kurt Luther, Kelly Caine, Kevin Ziegler, and Amy Bruckman. 2010. Why It Works (When It Works): Success Factors in Online Creative Collaboration. In *Proceedings of the 16th ACM International Conference on Supporting Group Work* (Sanibel Island, Florida, USA) *(GROUP '10)*. Association for Computing Machinery, New York, NY, USA, 1–10. https://doi.org/10.1145/1880071.1880073

[50] Sarah J McCarthey and Susan McMahon. 1995. Three Approaches to Peer Interactions During Writing. *Interaction in Cooperative Groups: The Theoretical Anatomy of Group Learning* (1995), 17.

[51] Nora McDonald, Sarita Schoenebeck, and Andrea Forte. 2019. Reliability and Inter-Rater Reliability in Qualitative Research: Norms and Guidelines for CSCW and HCI Practice. *Proceedings of the ACM on Human-Computer Interaction* 3, CSCW (2019), 1–23.

[52] Jakob Nielsen and Rolf Molich. 1990. Heuristic Evaluation of User Interfaces. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 249–256.

[53] Sylvie Noël and Jean-Marc Robert. 2004. Empirical Study on Collaborative Writing: What Do Co-Authors Do, Use, and Like? *Computer-Supported Cooperative Work & Social Computing (CSCW)* 13, 1 (2004), 63–89.

[54] Jay F Nunamaker Jr, Robert O Briggs, Daniel D Mittleman, Douglas R Vogel, and Balthazard A Pierre. 1996. Lessons From a Dozen Years of Group Support Systems Research: A Discussion of Lab and Field Findings. *Journal of Management Information Systems* 13, 3 (1996), 163–207.

[55] Kenton O'Hara and Barry Brown. 2006. *Consuming Music Together: Social and Collaborative Aspects of Music Consumption technologies*. Vol. 35. Springer Science & Business Media.

[56] Steve Oney, Christopher Brooks, and Paul Resnick. 2018. Creating Guided Code Explanations With chat. codes. *Proceedings of the ACM on Human-Computer Interaction* 2, CSCW (2018), 1–20.

[57] So Yeon Park and Blair Kaneshiro. 2017. An Analysis of User Behavior in Co-Curation of Music Through Collaborative Playlists. *Extended Abstracts for the Late-Breaking Demo Session of International Society for Music Information Retrieval (ISMIR)* (2017).

[58] So Yeon Park and Blair Kaneshiro. 2021. Social Music Curation That Works: Insights from Successful Collaborative Playlists. *Proceedings of the 2021 ACM Conference on Computer-Supported Cooperative Work & Social Computing (CSCW)* (2021). https://doi.org/10.1145/3449191

[59] So Yeon Park, Audrey Laplante, Jin Ha Lee, and Blair Kaneshiro. 2019. Tunes Together: Perception and Experience of Collaborative Playlists. *International Society of Music Information Retrieval (ISMIR)*.

[60] Jon L Pierce and Iiro Jussila. 2010. Collective Psychological Ownership Within the Work and Organizational Context: Construct Introduction and Elaboration. *Journal of Organizational Behavior* 31, 6 (2010), 810–834.

[61] Jon L Pierce, Tatiana Kostova, and Kurt T Dirks. 2001. Toward a Theory of Psychological Ownership in Organizations. *Academy of Management Review* 26, 2 (2001), 298–310.

[62] Jon L Pierce, Tatiana Kostova, and Kurt T Dirks. 2003. The State of Psychological Ownership: Integrating and Extending a Century of Research. *Review of General Psychology* 7, 1 (2003), 84–107.

[63] Lev Poretski, Ofer Arazy, Joel Lanir, Shalev Shahar, and Oded Nov. 2019. Virtual Objects in the Physical World: Relatedness and Psychological Ownership in Augmented Reality. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. 1–13.

[64] R Core Team. 2018. *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/

[65] Daniela Retelny, Sébastien Robaszkiewicz, Alexandra To, Walter S Lasecki, Jay Patel, Negar Rahmati, Tulsee Doshi, Melissa Valentine, and Michael S Bernstein. 2014. Expert Crowdsourcing With Flash Teams. In *Proceedings of the 27th Annual ACM Symposium on User Interface Software and Technology*. 75–85.

[66] John Rieman, Marita Franzke, and David Redmiles. 1995. Usability Evaluation With the Cognitive Walkthrough. In *Conference Companion on Human factors in Computing Systems*. 387–388.

[67] Ricarose Roque, Yasmin Kafai, and Deborah Fields. 2012. From Tools to Communities: Designs to Support Online Creative Collaboration in Scratch. In *Proceedings of the 11th International Conference on Interaction Design and Children*. 220–223.

[68] Markus Schedl, Hamed Zamani, Ching-Wei Chen, Yashar Deldjoo, and Mehdi Elahi. 2018. Current Challenges and Visions in Music Recommender Systems Research. *International Journal of Multimedia Information Retrieval* 7, 2 (2018), 95–116.
[69] Kristen Schiele and Mine Ucok Hughes. 2013. Possession Rituals of the Digital Consumer: A Study of Pinterest. *ACR European Advances* (2013).
[70] Stacey D Scott, M Sheelagh T Carpendale, and Kori M Inkpen. 2004. Territoriality in Collaborative Tabletop Workspaces. In *Proceedings of the 2004 ACM Conference on Computer-Supported Cooperative Work & Social Computing (CSCW)*. 294–303.
[71] Lee Sherlock. 2009. Genre, Activity, and Collaborative Work and Play in World of Warcraft: Places and Problems of Open Systems in Online Gaming. *Journal of Business and Technical Communication* 23, 3 (2009), 263–293.
[72] Ben Shneiderman. 2000. Creating Creativity: User Interfaces for Supporting Innovation. *ACM Transactions on Computer-Human Interaction (TOCHI)* 7, 1 (2000), 114–138.
[73] Constance A Steinkuehler. 2004. Learning in Massively Multiplayer Online Games. In *Proceedings of the 6th International Conference on Learning Sciences*. International Society of the Learning Sciences, 521–528.
[74] Neomy Storch. 2005. Collaborative Writing: Product, Process, and Students' Reflections. *Journal of Second Language Writing* 14, 3 (2005), 153–173.
[75] Erin M Sumner, Luisa Ruge-Jones, and Davis Alcorn. 2018. A Functional Approach to the Facebook Like Button: An Exploration of Meaning, Interpersonal Functionality, and Potential Alternative Response Buttons. *New Media & Society* 20, 4 (2018), 1451–1469.
[76] James Tam and Saul Greenberg. 2006. A Framework for Asynchronous Change Awareness in Collaborative Documents and Workspaces. *International Journal of Human-Computer Studies* 64, 7 (2006), 583–598.
[77] Jennifer Thom-Santelli, Dan R Cosley, and Geri Gay. 2009. What's Mine is Mine: Territoriality in Collaborative Authoring. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 1481–1484.
[78] Ye Tian, Thiago Galery, Giulio Dulcinati, Emilia Molimpakis, and Chao Sun. 2017. Facebook Sentiment: Reactions and Emojis. In *Proceedings of the Fifth International Workshop on Natural Language Processing for Social Media*. 11–16.
[79] Stacy G Ulbig and Carolyn L Funk. 1999. Conflict Avoidance and Political Participation. *Political Behavior* 21, 3 (1999), 265–282.
[80] Dakuo Wang, Haodan Tan, and Tun Lu. 2017. Why Users Do Not Want to Write Together When They Are Writing Together: Users' Rationales for Today's Collaborative Writing Practices. *Proceedings of the ACM on Human-Computer Interaction* 1, CSCW (2017), 1–18.
[81] Chunhua Weng and John H Gennari. 2004. Asynchronous Collaborative Writing Through Annotations. In *Proceedings of the 2004 ACM Conference on Computer-Supported Cooperative Work & Social Computing (CSCW)*. 578–581.
[82] Hadley Wickham. 2017. *tidyverse: Easily Install and Load the 'Tidyverse'*. https://CRAN.R-project.org/package=tidyverse R package version 1.2.1.
[83] Bernhard Wilpert. 1991. Property, Ownership, and Participation: On the Growing Contradictions Between Legal and Psychological Concepts. *International Handbook of Participation in Organizations: For the Study of Organizational Democracy, Co-Operation, and Self Management* 2 (1991), 149–164.

Received June 2020; revised October 2020; accepted December 2020