

Collaboration

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To collaborate is to work jointly with one or others to the same end. There are multiple examples of famous creative collaborators in popular culture across various domains from music (e.g., Paul McCartney and John Lennon), art (e.g., Frida Kahlo and Diego Rivera), scientific innovation (e.g., Marie and Pierre Curie), opera (e.g., Gilbert and Sullivan) or even magic (e.g., Penn and Teller). Creative collaboration also occurs in groups from large scale movements such as the Romantics or Pre-Raphaelites who collaborated across different artistic domains and smaller ones such as members of a jazz ensemble or improvisational theater troupe. In all cases, group members are commonly accepted to have intimate involvement in the emergent creative works and oftentimes, the creativity is necessarily dependent on the involvement of others such as work in music and theater (Sawyer, 2004). These collaborations are often seen as tempestuous but productive and arising from a close intimacy maintained over an extended period of time.

This entry starts by assessing the differences between group creativity and collaboration. Then a distinction is made between direct collaboration, which is clear and explicit, and more indirect forms of collaboration where the collaborative traces of other unnamed partners (whether human or not) can still be clearly observed. Finally, there is a look at the challenges ahead for those who research this unique and complex phenomenon and also the implications of adopting a collaborative perspective on creativity as a whole.

The Importance of a Collaborative Perspective on Creativity

Current research on creativity shows a tendency to focus on the attributes of the creative individual or the individual's internal thought processes as the causal factors that produce creative cognition although this is more prevalent in creative cognition research than creativity research in management which has more of a focus on team cognition. This research focus necessarily privileges both the individual as a unit of analysis and a methodology which casts creativity as an additive and generally linear process. Such an epistemological position pins the locus of creativity on the individual and casts group creativity as something that occurs when a measurable outcome is formed by the interaction of these individual creative units (Glăveanu, 2011).

However, such a research program, while elucidating some aspects of the creative process, does not reflect collaboration as documented across other naturally occurring domains. Those who study collaborative creativity as distinct from group creativity assert that some creative processes and products cannot be fully understood at the individual level of analysis and that group level analysis is necessary (Glăveanu, 2011; Sawyer, 2004). This is true whether those groups are defined formally and recognized as a contained ensemble of participants (e.g., a football team) or less formally as a fluid ensemble of direct and indirect collaborators. Research into collaborative creativity approaches creativity as an in-between process with a final creative product that emerges from the combination and interaction of different, human (and even non-human) participants yielding a complex process which cannot be reduced to individual units of analysis.

The Distinction Between Group Creativity and Collaboration

There is not a consistent distinction between group and collaborative creativity in the research literature and although different researchers have pushed to make it clearer, the two terms are often used interchangeably. Traditional laboratory studies investigating how people create together (e.g., research on brainstorming; Oxley et al., 1996) have come to the often-surprising conclusion that working in groups reduces creative output whether that is assessed as the number of creative thoughts or the quality of those thoughts.

However, it is not clear that the conclusions of assessments of group creativity reflect creative collaboration and certainly not collaboration as it more commonly found outside of an experimental setting (Montuori and Purser, 1997). Such naturally arising and often self-selecting collaborations are qualitatively different to experiments of group creativity conducted in a lab. Lab based studies assess how a creative product, which could potentially be produced by an individual, changes when produced by more than one person. This position assumes that the other people in the process are simply another input into the input—process—output schema of individual cognition.

As such, this research focuses on such things as process gains and losses when assessing groups performance against the benchmark of individual performance reflecting a belief that there is a measurable outcome which could be achieved by an individual as much as by a group. A process gain is when a group working together outperforms the expected performance of someone working alone, a loss the inverse. Often, actual groups are pitted against nominal groups to create this benchmark. A nominal group in this instance is typically made up of the scores of matched individuals who have experienced the same task alone and whose scores are artificially tallied to produce a 'group' score. This artificial situation does not reflect collaborative creativity as understood in the wider literature.

However, the focus of this entry will be on collaboration that involves a creative product that could not be produced by a single individual and, in this context, relative process losses and gains become less important. **Moran and John-Steiner (2004, p. 11)** referred to collaboration as “an intricate blending of skills, temperaments, efforts and sometimes personalities to realize a shared vision of something new and useful.” Regarding collaboration as a naturally occurring relationship between two or more people often leads to changes in methodology with a focus on a qualitative, idiographic approach exploring how non-substitutable components interact. These components will almost certainly have different qualities to each other and thus products of collaboration as a complex system are best considered as truly emergent—that is irreducible to their constituent parts (**Sawyer, 2004**). In order to capture such creative phenomenon, it behooves us to extend the level of analysis beyond individual processes in a group environment to group processes.

Methodological Implications

As in all areas of psychology, the epistemological stance taken on the nature of collaboration in creativity drives the methodology used to understand it. Traditional quantitative outcome measures that aggregate means across people are ill equipped to capture the unique nature of collaboration as theorized above so researchers who study complex creative systems such as a jazz ensemble often employ idiographic and qualitative method to disentangle the contingent dynamics of collaborations. The more common methods used are:

1. Video data. Video data can be used in both natural settings (**Sawyer, 2004; Seddon, 2004**) and more artificial lab-based settings (**Bjorndhal et al., 2015**). These rich data sets allow the detailed analysis of actions, discourse and interaction with the surrounding environment. While at times traditional creativity tasks are used, the use of video data allows for a more detailed analysis of the process in real life tasks and an easier identification of communicative exchanges.
2. Interviews. Alongside traditional interviews, John-Steiner introduced the collaboration Q sort which invited collaborators to discuss where to place 50 statements on collaboration and then showed the resultant array to their collaborator. The discussion of differences and similarities is meant to spark a retrospective account of the collaboration and foster reflexivity.
3. Biographies. Much work on eminent creative minds has proceeded from letters, diaries and biographical details of the individual and work on creative dyads is no different when it comes to using this rich biographical detail to make inferences about the creative processes involved when two or more people work together.
4. Conversation Analysis. Alongside video analysis, a detailed look at how collaborators synchronize their utterances can be a good measure of integration and alignment in the creative process. This kind of analysis reveals both the content of communication and, more importantly, communicative patterns among collaborators.

Direct Collaboration

In many cases, collaborations are clearly defined and acknowledged cases of creative partnerships consisting of more than one named contributor to a final creative work. We characterize these as direct collaborations where collaboration is seen as two or more people intentionally working toward the same goal. These collaborations are formed from intentional partnerships arising from an intimate relationship built up over time.

Collaboration in the Lab

It is not impossible to measure true collaboration in the lab, but it requires a different approach and the understanding that working together does not necessarily indicate working *collaboratively*. In a series of papers, Johanne Philipsen explored how people working in groups produced and developed new ideas as they worked with LEGO bricks. She video recorded teams of 3–4 participants as they built LEGO models of concepts such as “justice” and “collaboration”. Clearly, such concepts don't directly correspond to a particular configuration of LEGO blocks and accessories, hence the exercise results in contingently singular constructions determined by group dynamics. Philipsen and her collaborators used this video corpus to mine for interaction styles—inclusive, instructional, integrative—among team members and their resulting material traces, as revealed by the LEGO models produced (**Bjorndhal et al., 2015**).

The inclusive style of interaction is characterized by positive feedback and praise: everyone's idea is validated and results in an uncritical quilt-like medley of ideas, “a concatenation of individual ideas” as the authors put it. The ownership of the resulting model was distributed although the final model didn't quite work. Participants appeared more focused on smoothing interactions with strangers and ideas were not critically elaborated. The lack of familiarity among members of the team appears to be a key factor since the authors reported that this form of interaction was more likely to occur early in the test session.

The second style of interaction, the instructional style, resulted in conceptual ownership that was less distributed since one member of the team guided the construction of the model. The leader or instructor elaborated her ideas, a process validated but not challenged by other team members. As a result, the final model was more coherent, reflecting the creative arc governed by a single constructor but the group potential was not leveraged to its full extent.

Finally, in groups with an integrative style of interaction, ideas were challenged and elaborated continuously through interruptions, amplifications, and negative feedback. Ideas were not unconditionally validated but rather connected and synthesized through a

distribution of cognitive labor. The material trace of an integrative style, that is the final LEGO model, was more coherent and reflected a more distributed creative process. In the instance described in the paper, the model embodied complex ideas such as the dynamics and outcomes of the presence or absence of “collaboration”. The integrative style was more likely to occur later in the problem-solving session when team members were more familiar with each other.

Close Collaborative Pairs

The integral role of familiarity when eliciting true collaboration in the lab is amplified when in ‘real world’ collaboration in which a singular creative product is generated alongside an ongoing social relationship. These close intimate relationships—be they familial, marital, or based in friendship—can lay fertile foundations for creativity in the arts and science. The long and shared history of interests, conversations, and joint experiences forges the trust required to think freely but also to accept and seek a partner's criticisms and alternatives; these elements can structure a productive and creative working relationship.

Innovative and celebrated sibling filmmakers include Auguste and Louis Lumière, Ethan and Joel Cohen, and Lana and Lilly Wachowski. The Wachowskis make multi layered, multi part, science fiction movies that challenge the orthodox movie narrative and which, in turn, require multiple viewings to appreciate their depth, texture and detail. They tackle issues of reality and identity, change and revolutions and the grotesque dystopian projection of corporate dominance over people and culture. The Wachowskis' creative collaboration extend beyond writing and directing, resulting in innovative techniques of cinematography (including the bullet time method to spectacular effects in *The Matrix*) and editing (in *Speed Racer*).

Hemon (2012) described how the Wachowskis adapted David Mitchell's (2004) “unfilmable” novel *Cloud Atlas*, the movie Lana Wachowski says she's most proud of (**Keegan, 2018**). Mitchell's novel involves a large cast of characters in six different stories spanning five centuries. **Hemon (2012)** depicted how the Wachowskis along with their close collaborator, Tom Tykwer, rented a beach house in Costa Rica where over weeks they segmented the novel into hundreds of scenes, sketched on colored cards, with colors corresponding to characters and time periods. These external representations were then physically manipulated, moved and re-arranged throughout a working day to determine which narrative arc worked best. This process was repeated the next day. It is through this form of distributed cognition—across three collaborators, across objects and their spatial arrangements, across time—that the film's innovative narrative structure emerged as well as the idea of using the same cast of actors, embodying different characters, across the centuries, capturing the novel's central idea, namely eternal recurrence.

Such an intimate collaborative relationship produces creative pieces that are irreducible to the internal cognitive processes of the individuals. Rather, they can only be understood as arising from a unique and contingent collaborative process. Moreover, in the case of long-term artistic collaborations like the Wachowskis', such works can only be understood when situated in a timeline in which the creative and personal are not only indistinguishable, but their very entanglement is an essential element of that creativity.

Artistic Collaboration in Groups

Some forms of artistic creativity are explicitly collaborative and necessarily relational; these cannot be carried out by a single individual, however talented. Group jazz improvisation is one such art form which simply cannot be understood in terms of individual, conscious cognitive processes. This form of group creativity is so explicitly collaborative that **Seddon (2004)** suggested it generates an “empathetic creativity”, that is, a creativity that is ontologically dependent on the presence of others. Indeed, such groups are a fundamental challenge to a reductionist notion of creativity, not only because an analysis of the individual's creative output would not capture the final product in a satisfactory manner, but also because it is impossible for the individuals in the group to know, let alone shape the creative process. In improvisational performance the social group is not only conceived of as influence, but it is present at each moment of the creative act and the resultant piece is explicitly interactional. When assessing the creativity of such a group, one can't just look at the product because it is necessarily ephemeral, so the listener must take into account the process, and the practice of music making; the “creative process and the resulting product are co-occurring” (**Sawyer, 1992**, p. 253).

Furthermore, band members cannot be simply exchanged for other equally talented members because music making in such ensembles is a dynamic and shifting mix of formal and informal approaches. As is the case with the types of close creative collaborations outlined above, creative processes in this environment are informed by social processes as much as the act of creativity itself (**Kenny, 2014**). Importantly, satisfactory improvisation in such groups does not happen spontaneously but rather arises from social interactions that act as backdrop to supply the level of trust necessary to work collaboratively (**Kenny, 2014; Seddon, 2004**). The creativity is enacted in the moment, but the collaborative ties are formed over time. In her ethnographic study of creative collaboration in a jazz ensemble, Kenny wrote of a “sense of camaraderie” (p. 4) and a “shared history” (p. 5) and Seddon told of two members of the band he studied who had attained a higher level of “sympathetic attunement” (p. 73) through spending time playing and traveling together. The piece of music then emerges from this mix of current work and shared history and cannot be understood simply as the addition of talents from interchangeable components in an easily generalizable model.

It is clear that a full understanding of at least some domains of artistic creativity requires understanding the complex dynamics of collaboration between people because the collective nature of the performers is an essential part of the creative process and product. In improvisational performance art, these dynamics are particularly important because the ephemeral nature of the product places the emphasis on the process and, in fact, collapses the distinction between the two.

Collaboration in Scientific Creativity

Scientific creativity is more commonly thought of as innovation, but it requires a level of creativity that is similar to the arts—the creation of something novel and valuable. Indeed, the parameters of novelty and value may be rather easier to establish in scientific creativity. Scientific collaboration is not a new phenomenon—the first co-authored paper appeared in 1665. There has, however, been a significant increase in scientific collaborations with ambitious projects such as the Large Hadron Collider pooling resources in order to further scientific discovery and creativity in way that a single team cannot afford to do. Co-authorship of scientific papers has been rising steadily both in terms of the numbers of authors and the number of countries from which those authors are drawn. This rise in collaboration is shaped by the increased ease of international communication alongside the need to share more advanced and expensive technological resources.

Increased collaboration has a positive impact on productivity and the citation level of individual researchers, but it also has a wider impact; it effectively increases the range of what is possible in scientific research. Beyond the pooling of financial resources, scientific collaboration allows creativity to develop in a non-linear, iterative and reciprocal manner. The benefits of scientific collaboration are not just realized by a brute force increase in numbers but also by encouraging and exploiting disciplinary diversity. As seen above, what emerges is more than a linear, additive formula treating collaborators as interchangeable units. This transdisciplinarity is essential to capitalize on serendipitous discoveries.

As collaboration occurs across disciplines, it encourages diverse groups of researchers to pool different areas of expertise to create something that would not be possible for one individual. This, in turn, allows individuals to become increasingly specialized within a team of other specialized individuals which they would not be able to do without offloading some skills to others. This creates an iterative relationship between the individual and the group extending beyond an analysis of the scientist as an individual. Moreover, such relationships are marked by a similar level of trust as the more standard artistic collaborations. The complexity of modern scientific collaboration supports a specialist rather than a polymath so it requires relinquishing individual control and therefore cannot be analyzed at a purely individual level.

Indirect Collaboration

Beyond the direct and documented collaborations outlined above, there is a growing research field which extends the understanding of collaboration to encompass objects, people and ideas which do not collaborate in a formal way, but which nonetheless shape and are agentic in the final creative process or product.

Cultural Collaboration: Sociocultural Serendipity

Not all collaboration is planned, direct and documented; some collaborations remain undocumented or even unnoticed but leave clear traces on creative output that is indistinguishable from the more direct collaboration outlined before. The phenomenon of multiple discovery when a scientific invention occurs simultaneously in different parts of the world, cannot be explained without reference to the social nature of creativity (Simonton, 2019). Beyond these moments of unrelated, simultaneous innovations, certain “golden ages”, elucidated by historiometric analysis, support an essential role for the socio-cultural milieu. These golden ages suggest that indirect collaboration is essential to the rise of eminent creative geniuses. Renaissance Florence is one such time period for artistic creativity as is the golden age of scientific creativity in the Islamic civilization (Simonton, 2019). These golden ages, with a concentration of eminent creative individuals, underscore the importance of non-intentional, spontaneous collaboration which may often be unacknowledged even by those involved.

Even those people characterized in the collective imagination as an individual genius who transcends those around them are perhaps best understood as arising from a complex network of indirect collaborations and socio-cultural forces. Take, for example, the work of Shakespeare: The modern desire to attribute authorship to one sole individual and grant him ownership of the text is anachronistic when applied to his plays which were generated when ideas of text ownership were not understood as they are today. It is notable that the entire field of authorship studies has now arisen to disentangle the phraseology and words that can be attributed to different single authors from this period. Thus, collaborations are woven into the very fabric of the texts society has inherited and these texts reflect speech patterns and thoughts that cannot be easily attributed to any one person. For example, Marlowe's and Shakespeare's influence on each other until the former's dramatic death was substantive to the extent that there are still many who are convinced that Marlowe is a better candidate for authorship of the plays commonly attributed to Shakespeare.

An analysis of the role of collaboration in creativity is incomplete without taking into account that the creative process happens in a particular sociocultural field which structures, constrains and extends possibilities beyond the potential of conscious and intentional collaborations explored in the previous section. There are fertile moments in history that generate cultural moments from which new creative products emerge. We would term this sociocultural serendipity. Serendipity describes a process beyond chance, characterizing moments in which both luck and the individual are necessary but not sufficient in themselves. Rather, serendipity is a relational term and generates a framework to understand how creativity can be reliant on both the exceptional talents of an individual and the unique

characteristics of a certain time period without privileging either. This sociocultural serendipity reflects a non-intentional but nonetheless vital collaboration between the individual and the sociocultural background.

The Audience

The role of the audience is pivotal to all creativity. Performance art is particularly heavily and necessarily reliant on audience participation; anything which occurs in the absence of an audience is not considered a creative act, it is a rehearsal. In compositional performance art, the final creative product is nominally created by the playwright, performer or choreographer but interpreted by the actors and, crucially, the audience. To return to the example of the jazz musicians, the interaction with the audience is typically considered a key element of the interactional context (Sawyer, 1992). Furthermore, in some cases, the audience is an active participant in the piece of art as it unfolds, even if not at the compositional stage.

Take, for example, Maria Abramović's 2010 MOMA piece of performance art "The artist is present." In this piece of work, Abramović was seated silently at a table while members of the public came to sit opposite her. While explicitly centered on Abramović and her presence, this performance was also necessarily interactional—the art and the audience became one. Indeed, one of the many creative outcomes of the piece was represented by the emotions provoked in the audience. The creative product shifted with each new visitor and generated an ephemeral process much like the improvisational jazz outlined above. While the initial creative idea arose in the artist (albeit not a socially isolated artist), the process of enacting that idea was necessarily collaborative and interactive. More recently, Netflix's television serial released an episode (*Bandersnatch*, David Slade [Director], Charlie Brooker [writer]) in which the audience can be actively involved and choose their own ending. Thus, while the writers and actors created the episode, the final form is a unique collaboration of their creativity and the choices of the audience. Indeed, with digital technologies making it easier to invite audience participation, this sort of asynchronous collaboration may be more common in the near future.

The same is true of art forms in which the audience is more commonly considered passive, such as the novel. For a fictional novel to function as a creative form, the readers are required to engage their imagination and to recreate the fictional world of the author. An unread book remains inert until it is recreated in the mind of the reader in the same way as a play is in a constant state of rehearsal until the moment it is staged in front of an audience. The reader has an essential role to play by taking the fiction beyond the control of the writer. This is clearly demonstrated by the intense disappointment some readers feel when there is a mismatch between a cinematic representation of characters and the character that exists in their imagination. The result emerges from the filling in of the spaces left by the writer and so is contingent on collaboration with the reader.

Material Collaboration

The creative product is often constrained by the things around it across all domains. It is a commonly reported phenomenon that the materials used in artistic creativity influence the creative act and shape and constrain what can be done.

Take, for example, the experience of working with clay. Paul March's (2019) writings on this process reveal how the actual physical materials with which he works shapes the creative process with the delicate nature of porcelain contrasting with the more robust nature of stoneware:

The physicality of sculptural experience can be felt by comparing two different clays: stoneware and porcelain. Metaphorically speaking, stoneware is dynamic, generous and forgiving—confident in its plastic potential. Porcelain is intransigent and full of inertia. With porcelain, the act of creation and the outcome of the engagement with my hands take place within boundaries set by the clay's limited elasticity and excessive friability. Sculpting with porcelain is a tense negotiation (March, 2019, p.137).

The subtly different affordances of the material used intervene in the final artistic work similar to a human collaborator. Moreover, there is a relationship of trust and tension which mimics the intensity of the human/human relationships described above. Other artists discuss being aware of how material reacts and how they respond to a question posed by the material rather than imposing their imagination on that object (Botella et al., 2013). Creativity implies production, co-creation. Just as performance art is contingent on the collaboration with the human audience for its very existence, artistic creativity is equally contingent on materials.

Conclusions

An understanding of collaboration in creativity takes us away from laboratory analyses of creative cognition happening in groups but being analyzed at the individual level, using measures and methodologies more suited for individual creativity. The focus on collaboration proposed here is not without its own challenges. To begin with, it is intrinsically difficult to study dynamic, developmental phenomena such as unfolding conversations and the trajectory of ideas in spaces of co-creation than measure personal traits or properties of objects. Second, the emergent nature of collaborative encounters makes it almost impossible to predict beforehand what will be produced and how. Finally, the creativity of collaborative pairs and groups is expressed at multiple levels, from the concrete outcomes they generate to the social consequences they usually have (e.g., creating group identities, fostering efficacy at a group level, promoting prosocial mindsets).

In the end, there is a tendency to reduce creativity (as is the case with many psychological phenomena) to the intentional acts of an individual which are then traced back to her internal processes, personal history or character traits. However, as argued here, creativity itself simply can't be explained fully using this level of analysis because creative processes emerge from the collaboration, explicit or implicit, of both intentional and unintentional creative agents. Even the most seemingly individual acts of creativity build on objects created through division of labor in society and ideas co-created with others, including cultural tools that are the outcomes of entire societies across time; creativity is temporally as well as socially situated. Collaborations often follow unique trajectories and their creative products emerge from the dynamic interplay of various factors that can only be interpreted in systemic and interactive terms.

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