

Moving from Me to We:

Moving From Me to We: Interpersonal Coordination's Effects on Self- Construal

Liam Cross, ^{1*}

Liam Whiteman, ²

Sarah Ward, ³

&

Gray Atherton¹

¹ Department of Psychology, Edge Hill University, Ormskirk, UK, L39 4QP.

² Department of Psychology, Faculty of Science and Technology, Lancaster University, Lancaster, LA1
4YF, UK

³ Department of Sociology, School of Human and Health Sciences, University of Huddersfield,
Huddersfield, HD1 3DH

ABSTRACT

We all move in time together throughout our lives, and doing so leads us to display more pro-social behaviours towards co-actors and think of them in more pro-social ways. However, little research has investigated how coordinated movement affects how individuals feel about themselves. This mixed-methods study took self-generated qualitative responses of how participants construe their own identities after either coordinated movement or a carefully matched control task. Responses were analysed qualitatively using thematic analyses, and quantitatively using content analysis. Four themes were identified from thematic analysis, and inferential statistical testing shows significant differences in how participants construe their identities post coordination (cf. control). Participants in the coordinated condition generated a higher proportion of interdependent (social) than independent (personal) self-construals, driven by differences in broad social structures/constructs rather than close specific social relations. Furthermore, participants in the coordinated condition reported less mental state items, and more sexual/romantic items. These findings may explain how and why coordinated movement leads to prosociality amongst those who take part by leading individuals to think of themselves and each other in group terms.

Moving from Me to We:

Interpersonal coordination is the process of moving in time with other people to a common rhythm (Phillips-Silver et al., 2010). People often coordinate their movements with each other in various ways, such as when dancing, singing or walking in synchrony (McNeil 1999). Moving in time together in such ways has been shown to foster a range of pro-social effects, including increased liking, similarity, closeness, overlap, rapport, helping and cooperation amongst co-actors (Anshel & Kipper 1988; Atherton et al., 2019; Cross et al., 2016, 2019a; 2020 Good & Ruso 2016; Hove & Risen 2009; Kokal et al., 2011; Launay et al., 2014; Rabinowitch & Knafo-Noam 2015; Rabinowitch & Meltzoff 2017; Reddish, et al., 2013,2014; Wiltermuth & Heath 2009).

Pro-sociality is typically assessed within this literature through behavioural measures (of cooperation & helping etc.) or self-report ratings (of relationships with co-actors in terms of liking, similarity, overlap etc.). The behavioural effects following coordination are now well established (i.e. Cirelli, et al., 2014; Cross et al., 2016; 2019 a,b; 2020 Good & Ruso 2016; Reddish et al., 2013; 2014, & Wiltermuth & Heath 2009, though see Kirschner & Illari 2014). However, the majority of research using self-report measures to explore prosociality has fundamentally focused on individuals perceptions of their recently coordinated co-actors, and our subsequent relationships with them (i.e. Atherton et al., 2019; Atherton & Cross, 2020, Hove & Risen 2009; Reddish et al., 2013, Wiltermuth & Heath 2009). Relatively little work has explored changes in how we perceive *ourselves* post-coordination, that is, how moving in time together affects our self-construals, our sense of identity.

One exception is Cross et al. (2019a) who found that those who had coordinated rated certain personality items to do with national pride, gender, sports fandom and one's uniqueness as less critical than those who performed an uncoordinated version of the same task. Other work has also found that individuals rate the unique/individual aspects of the self as less important following tapping in time together (Cross et al. 2020) or even imagining walking in synchrony (Cross et al. 2017). Indeed the extent to which people viewed themselves as individuals vs group members in the above two studies has been shown to partially mediate the relationship between coordination and affiliation / helping. In

Moving from Me to We:

summary, these studies suggest coordination does affect how individuals view their own identities and provide some evidence that these may mediate entrainment effects on pro-social outcomes like affiliation or helping.

Therefore, the way individuals construe their own identities (self-construals) may be intimately tied to prosociality. A person's self-construal can be understood as the thoughts, feelings and actions that both relate the self to others and draw a boundary around the independent self (Singelis, Bond, Sharkey, & Lai, 1999). People with more salient interdependent self-construals (socially situated identities) are more pro-social in several ways. They see more similarities with other people and are more likely to cooperate with and help people, in contrast to those with more independent self-construals (personally focused and introspective identities) (Karremans et al., 2005; Kuhnle & Hannover 2000, & Utz 2004). Self-construal orientation shows evidence that it exists as both a state and a trait. For instance, while people may be consistently more or less interdependent across a number of situations, self-construal is also sensitive to environmental changes. For instance, self-construal can be manipulated via priming (Stapel & Koomen, 2001) and social context (Brewer, 1991).

A shift in one's self-construal from independent to interdependent has been shown to mediate the relationship between prosociality and mimicry (Ashton-James, et al., 2007). Interpersonal mimicry is the process of imitating another person within a short window (usually a few seconds) which has been shown to have many of the same pro-social effects as interpersonal coordination, such as increasing liking, helping, cooperation etc (Vicaria & Dickens 2016). Self-construal may therefore prove a fruitful avenue of exploration for researchers wishing to explore the relationship between interpersonal entrainment and prosociality. It is currently not known how coordinated co-actors experience their own sense of identity or how one's sense of identity is affected by coordination. Looking at aspects of an individual's self-construal that are self-generated, and therefore fundamentally pertinent to the individual in question, might prove a fruitful paradigm in order to explore this relationship, as has been the case in

Moving from Me to We:

mimicry research (Ashton-James et al., 2007). In order to test this idea, self-generated responses to an open-ended identity question were explored in the present study.

Qualitative lines of enquiry allow a richer and more detailed picture of how and why people act in certain ways, compared to that which can be obtained from purely quantitative endeavours which rely only on analysing ranks and counts of individuals endorsement of pre loaded items. It can offer a more in-depth view into an individual's experience and highlight potentially fruitful avenues for exploration that were not initially considered, thus acting as a safe guard against the prior judgments imposed by researchers. O'Cathain and Thomas (2004)(2004) also raise the issue of power imbalances often present in quantitative inquiry, as closed-ended questions delivered through surveys are reflective of researcher hypotheses rather than the participant's experience. By including open ended questions, the participant is making the decision as to how they will represent their own viewpoint and how they will frame their own responses. Including such measures may shed new light on the subject and lead to useful conclusions that were not previously hypothesised in the design stage of the project. While qualitative data can better explain individuals own experiences and also helps control for researcher bias, it is not without its own drawbacks. Crucially, it can suffer from a lack of rigour normally afforded by more quantitative approaches, as it inherently adds an element of subjectivity to the data (Sandelowski, & Barroso 2003). Therefore, this study mixed qualitative analysis with quantitative analysis. in order to access rich user generated data pertaining to how individuals construe their own identities and how this may differ post coordination compared to a carefully matched uncoordinated movement task.

The Twenty Statements Test (TST) (Kuhn & McPartland, 1954) is an identity measure which asks the single open-ended question 'Who Am I?'. It allows individuals to self-generate those aspects of their self-construal which currently seem most pertinent and salient to them, as opposed to choosing between items compiled by the researchers. This is particularly important for exploratory research. Research on the TST has demonstrated a good degree of content validity and concurrent validity with other self-

Moving from Me to We:

instruments (Spitzer, Couch, & Stratton, 1971). Use of the TST as an open-ended assessment of self-construal has been found to be particularly sensitive in detecting areas of psychological change (Lumma, Böckler, Vrticka, & Singer, 2017). Lumma et al., (2017) gave individuals the TST at baseline and again at multiple time points during a longitudinal mental training course. Analysis of the TST responses showed that individuals' self-construal's reflected improvements in emotional understanding and positive affect. Studies such as this, and others (Fredrickson & Branigan, 2005; Isbell, McCabe, Burns, & Lair, 2013), reveal that the analysis of responses to open-ended questions, particularly through the use of the TST, may be efficacious for the exploration of self-construal, particularly as language has been shown to be a robust marker of psychological change (Chung & Pennebaker, 2007).

Qualitative and quantitative approaches to text analysis vary regarding methodology and the researchers' overarching theoretical assumptions (Pennebaker et al., 2003). One approach, which can be considered a "bottom-up" approach, is where the researchers attempt to identify critical themes through an emergent analysis, rather than relying on pre-established theoretical frameworks to categorise participant data. This method will herein be referred to as *thematic analysis*, as the researchers are identifying particular constructs and themes which naturally emerge from participant responses (Smith, 1992). Thematic analysis is particularly useful when there are no previous studies that have examined the construct of interest (as is the case here), and thus elements of interest are derived from the responses rather than previously identified constructs and hypothesis (Hsieh & Shannon, 2005). Following on from this, occurrence frequencies within themes can then be analysed in order to quantify responses. This form of analysis is beneficial when empirically testing a theoretical framework (Hsieh & Shannon, 2005). In this form of analysis, the text is explored through a "top-down" approach in which independent raters quantify how often responses fit into particular categories (Vaismoradi, Turunen, & Bondas, 2013). This form of analysis will be referred to as *content analysis*, as it examines the content of responses in light of a pre-existing, rather than emergent, framework. This

Moving from Me to We:

form of textual analysis lends itself to providing quantitative rigour to the qualitative investigation of open-ended responses (Hruschka et al., 2004).

This study utilised both thematic and content analysis to analyse TST responses. Thematic analysis was first used to explore what themes emerged naturally from the data, and these themes were then used to guide further predictions. Content analysis was next used to quantify support for those predictions. Participants first performed either a coordinated or uncoordinated movement task along with the experimenter. Following this, they were then asked to complete the TST, which involves self-generating up to 20 responses to the question 'Who am I?'. One planned comparison was scheduled before the data was collected. This comparison quantitatively explored differences in interdependent vs independent items generated by participants. It was hypothesised that participants in the coordinated condition would generate a greater proportion of interdependent items than those in the uncoordinated condition.

METHOD

Participants & Design

Seventy students and staff at a small British University volunteered to participate ($M_{age} = 25.09yr$, $SD_{age} = 8.59$, 22 males and 48 females), Participants were each paid £3 for their time. The sample size was determined in the design stage based on samples used in similar research (Ashton-James et al., 2007). Power analysis using G power confirmed that the study reported here is adequately powered to detect medium effect sizes at the .05 level. For t-tests, the analysis reported here has over 80% power, to detect medium effect sizes ($d=.5$, as reported in Cross et al., 2017). The study employed an experimental design with one between-subjects factor: Movement Type, which had two levels: Coordinated (i.e. moving in-phase or at 0°), or Uncoordinated (control).

Manipulation, Measures & Procedure

Participants were first brought into the lab and introduced to the experimenter. They then took part in the movement task which has been previously shown to produce lasting consequences on

Moving from Me to We:

prosociality (Cross et al. 2020). The participant and the experimenter moved a joystick (Genius MaxFighter F-17 with force feedback disabled) horizontally while sitting side by side. Each of the joystick's movements was visualised using a point-light display of two dots which replicated each of the joystick's movements on a laptop screen placed 1.5 m in front of them. In the coordinated condition, they each moved horizontally at 0.75Hz using the dots to coordinate their movements to maintain 0° relative motion (i.e. in-phase). For the control task, they made uncoordinated movements at different frequencies. The participant always moved in precisely the same way (at 0.75Hz), while the experimenter alternated between 0.6 Hz and 0.9 Hz (0.75Hz +/- 0.15Hz) between trials. Following a brief initial practice, participants completed six 60s trials. Each trial was preceded by a four-second visual demonstration pacing them to the required phase and frequency of movements. This experiment was run on a MacBook Pro with a custom Matlab toolbox (Wilson et al., 2005 a,b). Participants then completed the TST measure of identity, which measured how participants construed their own identities (Khun & McPartland, 1954). Participants were asked to generate as many responses as possible (up to 20 within 5 minutes) but were not required to answer all 20. Out of a possible total of 1400 response (20 possible responses x 70 participants), participant's generated 1020 responses.

RESULTS

Movement Manipulation Check

We first checked whether participants were coordinating appropriately during the coordination task. All movement trials except for the practice round were analysed. A low-pass Butterworth filter with a cut-off frequency of 10Hz filtered each dot's position time series. A 60Hz time series of the relative phase between the two dots was computed as the difference between the arctangent of each dot's velocity over position at each sample. Mean vector length (MVL) is the circular equivalent of the standard deviation (Batchelet (1981); see Wilson et al. (2005a, b) for more detail). It is the normalised length of the resultant vector obtained by summing the relative phase vectors from each time step and measures coordination stability. It also effectively summarises the consistency of the relative phasing (the

Moving from Me to We:

coordination) between movements. MVL ranges from 0 (indicating minimum stability, a uniform circular distribution) to 1 (indicating maximum stability, no variability). An independent samples Mann-Whitney U test showed those who moved in-phase ($M=.796$, $SD=.079$, $Mdn=.801$) coordinated significantly more consistently ($U=1,225$, $p<.001$, $Z=7.195$,) than those in the control condition ($M=.204$, $SD=.069$, $Mdn=.196$). This confirmed that our movement manipulation had created the desired contexts to interpret the following results.

Self-Construal Content Analysis (Planned Comparison)

It was of initial interest to analyse the extent to which participants viewed their self-construal in independent vs interdependent terms. To achieve this, all TST responses were first ranked as either independent (self-focused) or interdependent (other-focused). Researchers were blinded from the participants' conditions. Items were coded as a) independent if they related to characteristics or descriptions that pertained purely to the self (i.e. *I am smart, I am moody*) or b) interdependent if they were characteristics that were dependent upon other people (i.e. *I am kind to others, I am friendly*) or descriptions that pertained to other people or social structures (i.e. *I am a sister, I am a lover, I am a Christian*). Four items were disqualified as they did not make sense (*I am 'law', I am 'makeup' I am 'left' & I am 'countryside'*). Both coders independently noted these items as disqualifications.

Inter-rater reliability between the two coders was high ($\kappa = .856$). All items which the coders independently agreed as either independent or interdependent were classified as such. Items which were not agreed upon were excluded from further analysis ($n = 97$ items) to maintain a level of objectivity in coding. A composite score was created for the self-construal measure. This score comprised the number of interdependent responses generated by a participant divided by the total number of responses generated by that participant, equalling the proportion of total responses that were interdependent for each participant. Next, composite scores were examined for outliers using box plots (in line with recommendations by Field 2012). Two outliers were identified (case 44 & 52), which were excluded from the analysis. Shapiro Wilkes tests confirmed that the distribution of composite scores did

Moving from Me to We:

not significantly deviate from normality for either condition (both $p's > .05$) and Levene's test indicated there were equal variances between conditions ($p > .05$). Therefore, an independent t-test was performed to explore whether there was a significant difference in self-construal scores between movement conditions. On average, those in the coordinated condition reported a larger proportion of interdependent responses than those in the uncoordinated condition $t(66)=2.96, p=.004, d= .72$. See Figure 1 for the mean interdependent self-construal items generated and standard errors.

Thematic Analysis

To identify further patterns in responses between conditions, the primary researchers independently read the responses several times and identified overarching themes that characterised the data sets. Researchers began by independently coding one of the two datasets and marking any notable themes in the data. They then switched datasets and repeated the process, noting any themes which were novel to the second dataset. Therefore, the order in which each dataset was coded was counterbalanced, and the datasets were blinded so coders did not know which dataset came from a particular condition. Each researcher independently generated a list of themes which were present in either one or both datasets. The researchers then engaged in discussing their findings and identified a master list of themes that they both agreed were present. The four following themes were identified, example items from each theme are given below it in brackets.

- 1) **Close social relationships/constructs** – This theme represented defining the self in terms of close social relationships and was further split into two sub-themes.
 - a. **Familial** – which represented items concerning close family/kinship ties.
(*A mother, A sister, A daughter, A family person, Somebody's son, Family orientated*)
 - b. **Friendship** - which represented items concerning friendship ties.
(*A friend, A good friend, Friendly, Love my friends, Good at making friends*)
- 2) **Broad social constructs** – This theme represented defining the self in terms of broad social constructs with which people might identify, such as ethnicity, nationality, religion and social class.

Moving from Me to We:

(a Christian, African, Working class, Romanian, Black, Muslim, American, Socialist, Republican)

3) **Sexual/Romance** – This theme represented defining the self in terms of romantic relationships and sexual preferences.

(A hopeless romantic, A sexual partner, Good at pleasuring my partner, Sexy, Bisexual)

4) **Mental states** – This theme represented defining the self in terms of mental states, or thinking about thinking, such as beliefs, desires, emotions, knowledge and mood.

(Emotional, Creative, Moody, Sensitive, Positive, Stressed, Open Minded, Naïve, Thoughtful)

The initial analysis identified that people construed their identities more interdependently than independently post coordination. It was hypothesised that this difference could be driven by an increase in people thinking of their identities more in terms of either close social relationships or broad social constructs post coordination (cf control). To test which of these explanations were better supported by the data, content analysis of the above themes was undertaken and frequentist statistics employed. To determine whether and the degree to which identified themes were present to a greater degree amongst responses from either condition, all items were independently coded by two new coders (as described in the next section). To ensure previous thematic analysis did not contaminate further exploratory content analysis, these two coders were blind to all previous analysis, the study aims, and conditions. It was also hypothesised that there would be no difference in the number of positive vs negative items between those who moved in a coordinated versus uncoordinated way. This distinction was not identified through thematic analysis; it was included as a check that the social effects of coordination were not simply due to positive affect as has previously been suggested by Reddish et al. (2013).

EXPLORATORY CONTENT ANALYSIS

For each of the below analysis, each item was coded as either representative of the given category/construct or not. The codebooks detailing how items were categorised for a given construct

Moving from Me to We:

were based on research by (MacQueen, McLellan, Kay, & Milstein, 1998), and can be found in the Appendix. Coders used Oxford Dictionary definitions to guide their judgement of how to categorise a given item. All the interrater reliabilities between coders were satisfactory ($\kappa = .791 - .961$). All items independently agreed by the coders as being representative of a given category were classified as such, items that were not agreed upon were excluded. See table 1 for the interrater reliabilities and the number of exclusions for a given category.

Composite scores were created for each of the participants for a given construct (the number of mutually agreed hits for a given category per participant divided by the total number of responses generated by that participant, except for positive/negative items where total hit counts for each were used, see below for more details). Next, composite scores were examined for outliers as previously outlined, except for the Sex/Romance construct as this data was found to be heavily skewed (skewness = 3.053, SE = .287, kurtosis = 9.659 SE = .566.). All composite scores greater than 0 were identified as outliers. Therefore nothing was excluded from this analysis, and non-parametric statistical methods were used. The number of outliers for a given category can also be found in Table 1. SW tests confirmed that all of the composite scores were found to deviate significantly from normality ($p's < .001$) for every variable except for the coordinated conditions of the Mental States construct and the positive items ($p's > .05$). Therefore, all data were analysed using independent samples Mann Whitney U tests. All descriptive statistics for the below analysis can be found in Table 2.

Where no difference was found, Bayesian analysis is reported alongside classical frequentist analysis. One advantage of the Bayesian approach is that it compares how likely the null hypothesis is compared to the research hypothesis. The Bayes factor (BF01) allows us to draw an inference from our data about the probability of the null hypothesis being true (Jaroz & Wiley 2014). This approach is favourable over the frequentist approach in this study as it allows us to infer support for the null hypothesis. A BF01 above three is considered substantial evidence for the null hypothesis (Kass &

Moving from Me to We:

Raftery 1995). A BF of three indicates that the null hypotheses are three times more likely than the research hypotheses.

As is shown in Figure 2, on average those in the coordinated condition reported a greater proportion of broad social constructs than those in the uncoordinated condition, $U = 67.98$, $Z = 2.14$, $p = .032$, $r = .27$. There was no such difference for specific social relationships/constructs, where those in the coordinated condition reported similar proportions of familial ($U = 590.5$, $Z = .96$, $p = .337$, $r = .12$, $BF_{01} = 2.844$), and friendship ($U = 549.5$, $Z = -.61$, $p = .542$, $r = .07$, $BF_{01} = 3.72$) items as those in the uncoordinated condition (please see table 2 for descriptive statistics). On average, those in the coordinated condition reported a greater proportion of sexual/romance items than those in the uncoordinated condition, $U = 737.5$, $Z = 2.525$, $p = .012$, $r = .3$. In comparison, those in the uncoordinated condition reported a greater proportion of Mental State Items than those in the coordinated condition, $U = 394$, $Z = -2.26$, $p = .024$, $r = .27$. See figures 3 and 4 for the mean and standard errors for these variables. For positive vs negative constructs, the total number of items fitting a given category was used instead of proportions. We were more interested in total effect than the proportion of items. There was no difference between the conditions for either the total number of positive ($U = 607.5$, $Z = -.059$, $p = .953$, $r < .01$, $BF_{01} = 4.017$) or negative ($U = 595.0$, $Z = -.208$, $p = .835$, $r = .03$, $BF_{01} = 4.048$) items (see table 2 for descriptive statistics).

DISCUSSION

This work highlights the benefits of utilising a mixed-methods approach to understand how coordination affects how individuals view their own identity. Four themes were identified in the thematic analysis, which led to further quantitative analysis exploring which of these themes differed amongst those who had not previously engaged in motor coordination. A primary area of interest was identified and analysed before conducting the thematic analysis. Specifically, investigating whether there was a difference in the proportion of interdependent vs independent self-construal items generated post-coordination compared to control. Based on previous research (Ashton-James et al., 2007, Cross et al.,

Moving from Me to We:

2017; 2020) it was hypothesised that people in the coordinated condition would report a greater proportion of interdependent self-construals compared to those in the uncoordinated condition. Our findings supported this hypothesis as participants who coordinated reported almost twice the proportion of interdependent items than those in the control condition. This suggests that post-coordination interdependent self-construals become more salient, and independent self-construals less so. This may be part of the mechanism by which other pro-social effects are cultivated by entrainment (Karremans et al., 2005; Kuhnen & Hanover, 2000; Utz, 2004).

Indeed, a growing body of research suggests that the relationship between coordination and its socio-emotional consequences may be best explained by coordination leading co-actors to view themselves and each other in common group ways (see Cross et al. 2019c for a review). This work adds to this debate showing that interdependent identities are indeed more salient post coordination. This is in line with most work, indicating that coordination leads individuals to view themselves less in terms of their independent and more in terms of their interdependent selves. While this work utilised a mixed-method approach examining self-generated identity labels, future research may wish to combine this method with more experimental approaches to disentangle the impact of coordination on various levels of self-construals (i.e., sub vs superordinate groups to which ones co-actor does/not belong to).

Following the above-mentioned pre-planned analysis, participant responses were thematically analysed in line with Hruschka et al. (2004) recommendations. Rather than exploring responses through the lens of a priori hypotheses, naturally emergent patterns were explored. This led to the generation of four themes and four further exploratory tests. These themes were not pre-selected based on researchers a priori, but rather naturally emerged through the data through thematic analysis. These were independently observed by two separate coders and then demonstrated to statically differ (or not) between conditions using content, frequentist and Bayesian analyses.

The first theme showed that people identified more with broad social constructs or groups post-coordination (cf. control), while this was not the case for specific social relationships such as familial or

Moving from Me to We:

friendship relationships. Those who had previously coordinated generated over three times the proportion of items relating to broad social constructs or groups such as ethnicity, nationality, religion, and social class compared to those in the control condition. However, there was no significant difference between how often participants in either condition generated items concerning specific or close social relationships/constructs to do with family or friends. For these constructs, Bayesian analysis provided evidence for the null hypothesis that there was no difference between the groups, therefore providing evidence that coordination did not influence how participants changed their self-construals in these terms.

The first finding showed that coordination affects how people view their own identities, specifically that post-coordination, they view their self-construals in more interdependent than independent terms. However, this increased interdependence could have been driven by two things: 1) it may be that entrainment increased how participants viewed their identity in terms of close social relations or 2) it may have been that they take a broader lens and view their identity in terms of wider social constructs. These findings reported here suggest that entrainment is likely to change how people view their self-construal in terms of broad social constructs, but not specific or close ties. This finding has important implications for the literature, as recently summarized by Michael et al., (2020) there are two leading explanations for the relationship between entrainment and prosociality, both involve a shift in individuals social perceptions, one at the group level, the other at the specific (individual) level. The findings reported here favour the group-level explanation. Indeed, if coordination's social effects are influenced by changes in how individuals view their identity post entrainment, as is the case with mimicry (Ashton-James et al., 2007) then this finding suggests that it may be more to do with how people view themselves in terms of broad social structures or groups as opposed to their individual relations. Results reported here suggest that changes are more likely to occur at the more general group level than at the level of individual relationships (as has also been offered by Launay et al., 2016; & Good, et al., 2017).

Moving from Me to We:

It is worth noting that there are mixed findings in the literature in terms of coordination's effects on individuals self-construals. While multiple studies have shown that following coordination, the individual levels of identity are rated as less important and the group level ones by others (Cross et al. 2017; 2019a; 2020), one study also found that some identity items (relating to sports fandom, gender and national pride) were also rated as less important following coordinated (cf. uncoordinated) movement. However, the current study suggests that identity items relating to broad social structures (including gender and nationality) are more salient following coordinated (cf uncoordinated) movement. Future work may wish to combine ratings of importance to self-generated identity items to better understand this relationship between salience and importance. Similarly, the current study did not evaluate the salience or importance of different group identity levels. That is in terms of subordinate vs superordinate levels, or in terms of those social groups or constructs through which individuals perceive their co-actors. Future work should aim to expand on these avenues of exploration to better understand how coordination affects our sense of self, how this relates to social categories we share with co-actors and how this is related to the other social consequences of coordination.

It was also found that participants construed their identities less in terms of individualised functions like mental states post-coordination (cf. control). Those in the coordinated condition generated just under half as many mental state items relating to their own beliefs, desires, emotions, knowledge, and mood compared to those in the control condition. This finding backs up those previously described showing that participants were thinking about themselves less in individualised and personal ways post-coordination (cf control). This finding may prove particularly useful in understanding how and why coordination has been shown to cultivate social consequences that would not typically be considered pro-social, such as increasing conformity and obedience amongst those who engage. For example, Wiltermuth (2012 a,b) research shows that people are more susceptible to conform to the whims, desires, and demands of others post-entrainment, such as subjecting people to aggressive noise blasts and killing bugs, when directed to do so by those with whom they have entrained. The findings suggest

Moving from Me to We:

that metacognition, (cognition concerning one's mental states, beliefs and desires) are less salient following coordination. This may help explain why people would be more susceptible to conform to others' whims and desires since one's own beliefs and morality would be less salient and therefore less available or essential in directing their decisions and behaviour. In this way, increased conformity following entrainment may stem from reduced conscious access to one's own beliefs and sense of moral agency.

Overall, the findings reported here share one superordinate theme; they all show how people view themselves in less individuating ways and more in group terms post-coordination, with such changes occurring at the level of broader social groups, than at the level of close social contacts or relationships. This may help explain the wide range of effects coordination has, which are much wider than those that could be considered as merely pro-social (i.e. conformity/obedience). It may be the case that entrainment has the effects it does via cultivating a shared group mentality amongst co-actors. They no longer think of themselves as separate individuals as members of a shared collective (as was shown in Good et al., 2017). Although this hypothesis was not directly tested here, future work should aim to investigate whether changes in self-construal might mediate coordination's social effects, as is the case with mimicry (Ashton-James et al., 2007).

Though not directly driven by the thematic analysis, this work also explored whether participants generated a more significant number of positive or negative items following either movement condition. It was predicted that this would not be the case and that coordination would not lead to a different degree of positive or negative items than control groups. The results supported this prediction, and Bayesian analysis showed support for the null hypothesis. This analysis was included as a check that entrainment's effects are not merely due to positive affect (i.e. participants feeling more positive post-entrainment). These findings also add to a growing body of work that suggests that entrainment effects on prosociality are not driven by an increase in positive affect (Cross et al., 2016; 2017 Hove & Risen 2009).

Moving from Me to We:

One benefit of using self-generated responses, as opposed to ratings and scales on items generated by researchers, is that it allows data to be explored in an emergent way. Although sometimes considered a weakness of qualitative research, this approach offers the potential to shed light on areas of interest that were not considered a priori but emerge naturally from the data. One such area was identified here from thematic analysis. Results showed a greater identification of the self in terms of sexual/romantic constructs amongst those that had moved in a coordinated way. Participants in the coordinated condition reported over ten times the proportion of sexual/romantic items than those in the uncoordinated condition. This finding supports evolutionary theories that coordination once served an adaptive purpose in our history to do with mate selection and attraction (i.e. Merker 2000), and models of sexual stimulation that position synchronicity as central to sexual pleasure and subsequent mate choice (Safron, 2016).

Exploring user's experiences of coordination with qualitative methodologies is beneficial as it allows an insight into the participant's world that is not afforded by purely quantitative research. Researchers can gain insight into participants' actual experiences and the aspects of self-construal that were most pertinent to them after coordination. While such qualitative endeavours are not without their limitations as previously discussed, by using a mixed-methods approach researchers can enjoy the rich insight that the qualitative approach allows without losing the empirical rigour afforded by the quantitative approach. It is also important to note that these findings rest on the observation of a single study with participant's from a single university moving in time (or not) with a single confederate. Further details about participant's such as their nationality, ethnicity, gender or other characteristics were not analysed. All of these and other factors are likely to affect individuals self construal. Equally, the attributes of the confederate, despite remaining stable across participants and conditions, may have also influenced this.

In conclusion, this work offers a new way to explore the socio-emotional consequences of interpersonal coordination using a mixed-method's tool kit. This is the first work to explore how moving in time together affects how individuals feel about themselves. Therefore, future work may wish to

Moving from Me to We:

replicate these findings, perhaps using alternative methods such as ranking items or using the tool kits of natural language processing. It will also be of importance to explore the transience of the effects. These preliminary findings show that following a short coordination task people construe their identity in more interdependent and less independent ways. This is driven by viewing the self more in terms of our broad social constructs than close social relationships. Post coordination, people also consider themselves in more sexual/romantic lights while mental state or metacognitive elements of self-construal are less salient.

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TABLES

	Inter-rater reliability (Cohens Kappa)	Number of exclusions	Number of outliers
Broad social constructs	.946	10	5
Familial	.945	12	5
Freindship	.961	5	2
Sexual/Romance	.905	5	0
Mental States	.791	162	2
Positive	.870	123	0
Negative	.805	60	0

Table 1. Inter rarter reliability, exlusions and outliers for all variables.

Moving from Me to We:

		Mean	SD	Median
Interdependnet	<i>Coordinated</i>	.37	.215	.4
	<i>Uncoordinated</i>	.23	.164	.19
Broad social constructs	<i>Coordinated</i>	.044	.044	.048
	<i>Uncoordinated</i>	.023	.042	.015
Familial	<i>Coordinated</i>	.046	.062	.032
	<i>Uncoordinated</i>	.033	.058	.057
Freindship	<i>Coordinated</i>	.026	.037	.026
	<i>Uncoordinated</i>	.034	.044	.031
Sexual/Romance	<i>Coordinated</i>	.023	.05	.013
	<i>Uncoordinated</i>	.001	.009	.001
Mental States	<i>Coordinated</i>	.179	.122	.177
	<i>Uncoordinated</i>	.285	.206	.3
Positive	<i>Coordinated</i>	4.94	3.24	4.64
	<i>Uncoordinated</i>	5.09	3.92	4.67
Negative	<i>Coordinated</i>	2.91	2.48	2.25
	<i>Uncoordinated</i>	2.97	2.29	2.71

Table 2. Descriptive statsics for all variables.

FIGURES

Moving from Me to We:

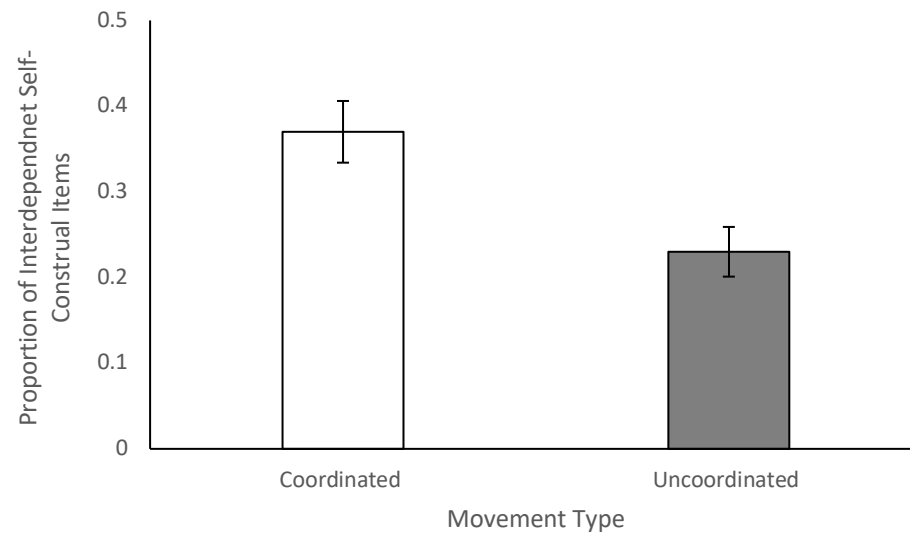


Figure 1. The mean Interdependent Self-Construal scores and SE's.

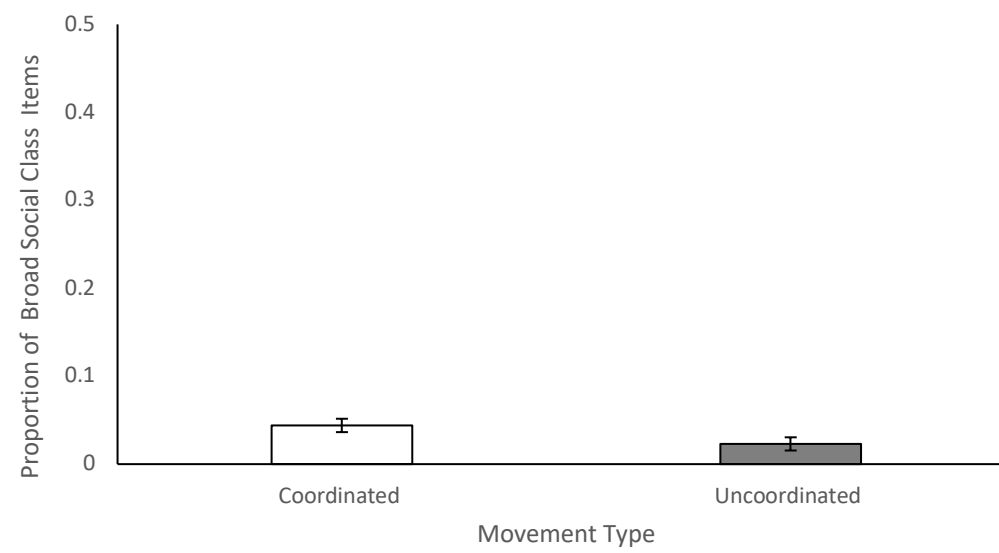


Figure 2. The mean Broad Social Construct response scores and SE's.

Moving from Me to We:

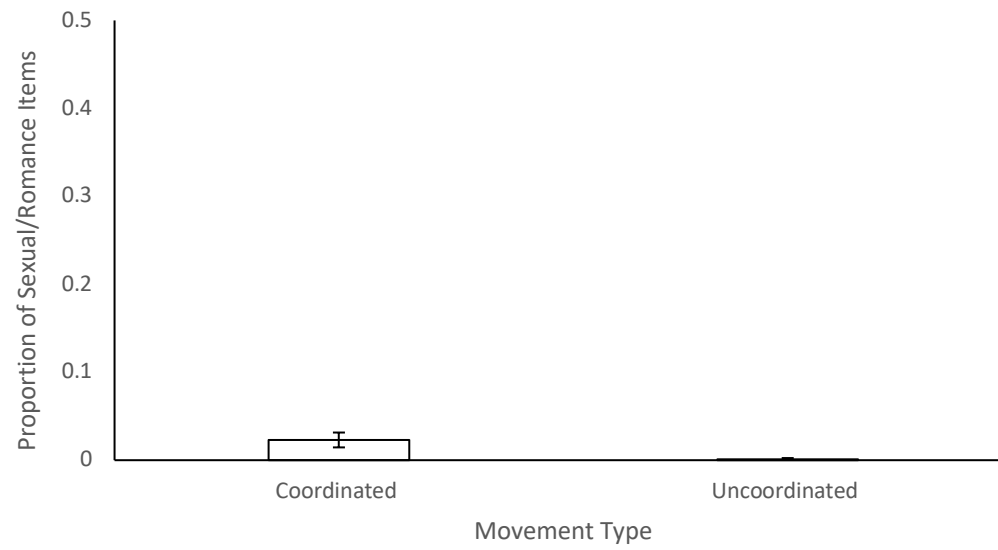


Figure 3. The mean Sexual/Romance response scores and SE's.

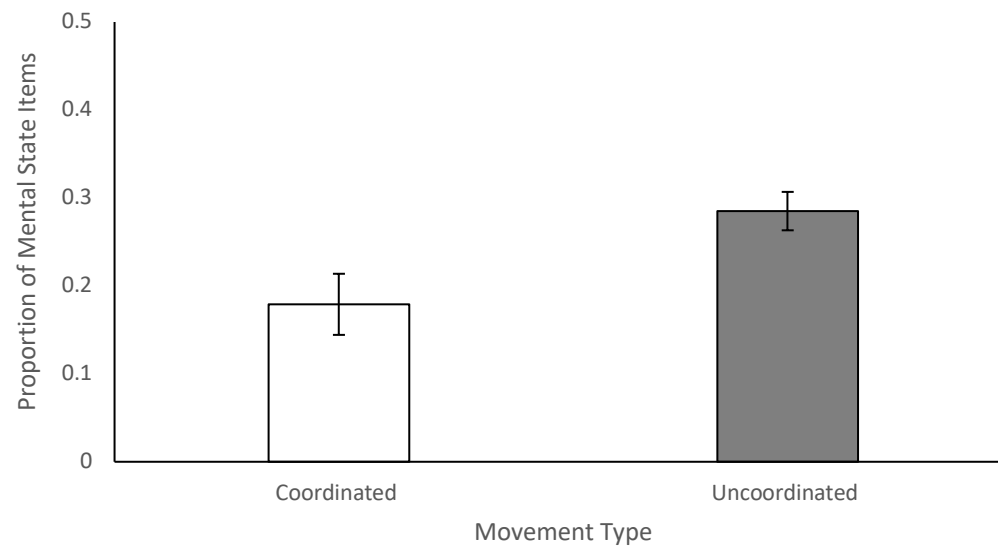


Figure 4. The mean Mental States response scores and SE's.

APPENDICIES

Broader social construct	
Brief Definition	Identifying with a country of origin, a particular race/religion, social class. When a person references belonging to a social group with a common national or cultural tradition, or with a common racial/ethnic identity
When to Use	Code as 1 if an item references their religious identity, their country of origin, their social class, or their ethnicity/racial identity
When not to use	Code as 0 for anything else, if an item references their gender, their occupation, their immediate family, or participation in a leisure activity, or anything that does not fall into the above category
Examples	'Christian', 'Black', 'Japanese'
Familial	
Brief Definition	Familial relationships with others that are central to a person's everyday life and interactions. Family relationships that are generally considered the most important relationships, and relationships in which people spend the most time with the individuals they reference, or have important life events in the company of these individuals
When to Use	Code as 1 if an item defines themselves through their close relationships with people such as family members or romantic partners.
When not to use	Code as 0 for anything else, including when talking about more general relationships, such as those related to work or leisure activities like sports
Examples	'Husband', 'Mother', 'Sister', 'Grandchild'
Friendship	
Brief Definition	Feelings of friendship or seeing the self in relation to a friend, including feelings in relation to friends, or personality traits that are related to being friendly
When to Use	Code an item as 1 if it mentions friend groups, being a friend, or having emotions/personality traits that are related to their ability to be a friend
When not to use	Code as 0 for anything else, i.e. emotions/personality traits that are related to being generally social, such as 'caring' or 'considerate'. Do not use for relationships that are sexual/romantic, or reserved for family members
Examples	'friendly', 'a good friend', 'love my friends'
Sexual/Romance	
Definition	Defining self in terms of romantic partnership, sexuality. Identifying as a person who is sexual &/or involved in romantic relationships
When to Use	Code an item as 1 if it refers to sexuality, sexual orientation, boyfriend/girlfriend, wife/husband, dating and sexual feelings/performance
When not to use	Code as 0 for anything else, i.e. if talking about non-sexual family members, or friends. Code as 0 for emotions that are ambiguous in regards to sexuality such as 'curious' or 'caring'. Do not use for gender, such as 'male'
Examples	'Flirty', 'sexual', 'bisexual'

Moving from Me to We:

Mental States	
Brief Definition	Thinking about thinking. States of the mind such as beliefs, desires, emotions, knowledge, and thoughts. This includes talking about memory, feelings, learning, and mood
When to Use	Code as 1 if an item mentions how they feel, the way they think, characteristics about their memory, how they learn or what mood they are in, etc. Code as 1 if it mentions anything about their mind and how it works.
When not to use	Code as 0 for everything else, i.e. anything which does not relate to the mind, such as how they spend their leisure time. Code as 0 for occupational roles, such as being a student, teacher or family member. Do not use for social roles, such as friendship. Code as 0 for religious roles. Code as 0 for emotions/dispositions that do not relate to thinking or feeling such as 'kind', 'funny', 'strong', 'lazy'
Examples	'Naïve', 'analytic', 'forgetful'
Positive	
Brief Definition	Constructive, optimistic, desirable - A word that is generally considered by society to describe something that is desirable, beneficial and good
When to Use	Code an item as 1 if the item has a specifically desirable and beneficial connotation, such as describing a healthy relationship, or a positive ability or disposition. Use when there is a qualifying statement, meaning that the person includes a word that is unequivocally good, beneficial or desirable.
When not to use	Code as 0, if the item is negative (see relevant code book) or it has no valence or rating attached to it. It may be used when a person simply describes a role they fill, such as their job or their role in a family, or aspects of their appearance, how they spend their free time, or their ethnicity/country of origin or religion.
Examples	'Jolly', 'Smiley', 'Capable'
Negative	
Brief Definition	Not desirable or optimistic, An undesirable or pessimistic description relating to a person, attitude or situation. Considered by society to be generally 'bad' and to be avoided
When to Use	Code an item as 1 if the item is pessimistic, gloomy, cynical, or unfavourable. Use when a person describes being unable to accomplish something or disliking something that is generally considered to be good. Use this code when a person describes a personal weakness or foible.
When not to use	Code as 0, if the item is positive (see relevant code book) or it has no valence or rating attached to it. It may be used when a person simply describes a role they fill, such as their job or their role in a family, or aspects of their appearance, how they spend their free time, or their ethnicity/country of origin or religion.
Examples	'Controlling', 'Impulsive', 'Angry'

Appendix 1. Code books for all constructs in exploratory analysis.

Moving from Me to We:

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