Chapter 4
Dimensions of Group Coordination: Applicability Test of the Coordination Mechanism Circumplex Model

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Abstract This chapter discusses the Coordination Mechanism Circumplex Model, a content model of group coordination mechanisms that proposes the dimension of explicitness and the dimension of timing (Wittenbaum et al. 1998). It aims at solving confounds in former taxonomies of coordination mechanisms. We first critique these two dimension definitions. We then report on our coder agreement study of the intelligibility of the two dimensions. As hypothesised, empirical agreement among the coders in our study varies with the built-in difficulty of the mechanism sets (macro-, meso-, and micro- level of coordination), and the expertise level of the coders (experts vs. novices) compensates for this mechanism set difficulty. Plots of mechanisms in the Coordination Mechanism Circumplex Model accomplish the extensional definition of its two dimensions of explicitness and timing. We close by discussing next steps in theory building, including the elimination of the intentionality construct and the consideration of the perspective of producers and targets of coordination mechanisms.

4.1 The Coordination Circumplex

As stated in the inclusive group coordination model described in Chap. 2, the elements of coordination in a group (e.g. the group's task and functions as well as its mechanisms and processes) need to be as well specified as possible in order to describe and explain the coordination of a particular group. In this chapter we

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concentrate on specifying *mechanisms* of successful coordination, implying a plurality of mechanisms, many of which can be neutralised, moderated, or substituted. Prior to the development of a full coordination model, the coordination mechanisms themselves must be described and structured in order to explain their efficiency. Literature from different disciplines suggests lists of mechanisms providing for the same or similar functions and entities of coordination in social systems. Some authors of theoretical papers have attempted to categorise the mechanisms into two categories.

The dichotomies in Table 4.1 are intuitively arranged and are not meant in all cases to match the other mechanisms category of the same column (examples and comparisons are given later in the text). Two-category systems often confound attributes of exemplars. To resolve this, Wittenbaum et al. (1998) proposed a model with *two* dimensions intended to disentangle confounds of group coordination attributes. This Coordination Mechanism Circumplex Model (CMCM) (Fig. 4.1) structures coordination mechanisms according to their explicitness (implicit/explicit)

Table 4.1 Some two-category systems of coordination mechanisms

	Coordination category 1	Coordination category 2
March and Simon (1958)	Plans and prespecified programmes	Feedback and mutual adjustment.
Burns and Stalker (1961)	Mechanic	Organic
Van de Ven et al. (1976), Raven (1999)	Impersonal	Personal
Andersen et al. (2000)	Artefact-based	Oral
Argote (1982)	Programmed means	Non-programmed means
Mintzberg (1979)	Standardisation of processes, inputs, outputs and norms	Direct supervision and mutual adjustment
Entin and Serfaty (1999), Entin et al. (2005), MacMillan et al. (2004)	Explicit, verbal	Implicit, cognitive
Espinosa et al. (2004)	Explicit, intended	Implicit, unintended
Faraj and Xiao (2006)	Expertise coordination practise	Dialogic coordination

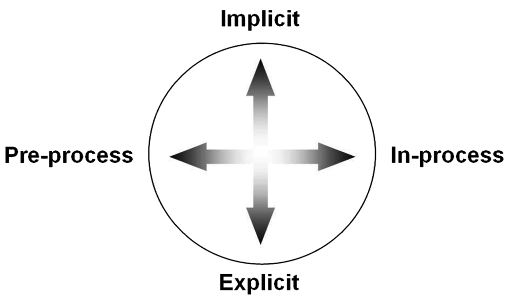


Fig. 4.1 The coordination mechanism circumplex model (CMCM), (adapted from Wittenbaum et al. 1998)

and according to the temporal phase (pre-process/in-process) when their coordination impact is accomplished. Our first aim is to discuss the advantages and weaknesses of this model.

Wittenbaum et al. (1998) explained the dimensions by giving examples for the four quadrants: *Explicit in-process* coordination sums up leadership, facilitation, negotiation with verbal agreements, and other overt forms of communication between group members during their interaction. According to their explicitness and their temporal occurrence within the actual group process, these mechanisms are easily observed by a third party and therefore dominate small group research. Coordination 'by feedback', 'personal coordination', 'direct supervision', 'dialogic', and 'oral coordination' from Table 4.1 are classified as explicit in-process coordination mechanisms.

In contrast, *explicit pre-process* coordination mechanisms are realised and perceived prior to group interaction. 'Predefined plans', 'programmed means', 'mechanistic coordination', 'standardisations' documented on hardcopy or within software systems are examples of explicit pre-process coordination from Table 4.1. In small group research guided by the input–process–outcome model (Hackman and Morris 1975), pre-process coordination mechanisms such as agendas or legal rules are commonly grouped as the *task* or as mere *context factors*.

Implicit pre-process coordination mechanisms begin to take effect before the exchange of group members occurs, but they are less salient, less intentionally constructed, less appellative, and therefore less observable. Wittenbaum et al. (1998) specified expectations and shared scripts regarding the task, the other members, and context factors as examples of implicit pre-process coordination mechanisms. Constructs such as culture, common knowledge, shared mental models, transactive memory, pre-knowledge, internalised conventions, expertise, and professionalism subsume to this mechanism type (e.g. Evans et al. 2004; Ramon et al. 2008). Small group research frequently incorporates implicit pre-process coordination indirectly by considering input variables such as group combination, homogeneity–heterogeneity, and group history.

Implicit in-process coordination includes mechanisms of tacit coordination (Wittenbaum et al. 1996), mutual adjustment, and local self-organisation (Fichtel et al. offer the term 'self-coordination' in Chap. 3 of this book to help explain tacit coordination). It might be the most challenging quadrant for empirical research, as these mechanisms are nearly impossible to observe in overt behaviour. Nevertheless, in some sense they also embody the core of social psychology mechanisms: The informational social influence as demonstrated by Sherif (1935) and the normative impact of a consensual majority (Asch 1952) are both important prototypes for implicit in-process coordination.

Bearing in mind Carnap's (1947) distinction of intensional versus extensional definitions of concepts, describing the dimensions of the Coordination Mechanism Circumplex Model merely through examples leaves the intensions of the terms implicit and explicit insufficiently defined. That said, even concrete examples become difficult to categorise: Is coordination by rituals, such as the greeting cycle of a telephone call, or by a behaviour setting (Barker 1968) implicit or explicit? Do other approaches outlined in Table 4.1 offer answers? Does explicitness require a persistent (verbal) code? Kim and Kim (2008) defined implicit/explicit coordination tautologically by implicit/explicit communication, never venturing outside the in-process phase. With a similar in-process focus, explicitness for the Aptima research group (Entin and Serfaty 1999, Entin et al. 2005; MacMillan et al. 2004) means verbalisation (e.g. requests) and that implicitness works via silent but elaborated cognitions (e.g. expectations and perspective taking). Wittenbaum et al. contrasted 'unspoken' versus 'verbalised' coordination mechanisms (1998, p. 5). Taking a different perspective, Grote et al. (2003) argued that implicitness is related to automatic processes, eliciting psychological compliance without cognitive control and conscious effort, whereas Andersen et al. (2000) contrarily proposed artefact-based coordination (see Table 4.1) for its automation. Godart et al. (2001) associated explicitness with extra processes and implicitness with mutual awareness, seemingly the main diagonal of Fig. 4.1. Espinosa et al. (2004) related their implicit/explicit distinction with the concept of intention: Explicit coordination mechanisms are realised, grasped, or used with the intention to coordinate a group. However, a study on subjective coordination theories reveals that implicitness can also be used intentionally (Kolbe and Boos 2009). A necessity to check for intentionality further challenges the level of precision of the CMCM. There is a long history of debate on scientific concepts of intentionality and its related subject of perspective. Coordination mechanisms can be compared to signs studied by semiotics. The relation of a sign and intentionality is connected here to the distinction of sender- versus receiver-theories of meaning (e.g. Nöth 1995, p. 109). Concerning biosemiotics, whose subject is communication among living systems not endowed with speech, the intentionality concept was replaced by the notion of semantisation and semantic specialisation: A proper sign is produced in order to signal, with an end result of conveying meaning. An object solely interpreted by perceivers as standing for something (e.g. smoke for fire) lacks this semantisation and semantic specialisation. Then there is the development of natural communicative signs such as body structures (e.g. colours in peacocks). Such signal structures are not at all intended by any organism: They evolved and changed their function from a pragmatic one to a semantic one without personal will, but rather by the mutual communicative benefit of receivers and senders. With this semiotic background in mind, the question arises as to whether implicitness should be defined from the perspective of the producers of a coordination mechanism (if there even is a producer), or from the perspective of the targets of that mechanism. The automatic processes that Grote et al. (2003) presented seem to be defined from the targets' perspective; the intentionality of Espinosa et al. (2004) and others might point toward the senders' perspective.

Clearly, there are a lot of tangents to the simple distinctions of the Coordination Mechanism Circumplex Model. Yet, in the context of group coordination mechanisms, the CMCM represents a marked progress from the two-category taxonomies in Table 4.1, which sometime confound a dimension such as explicitness with the pre-process phase, and implicitness with the in-process phase. Additionally, the model allows for a continuous distribution within each dimension and therefore offers at the very least an ordinal scaling of mechanisms within any given mechanism set. Although the dimension definitions must be articulated more precisely as research progresses, we maintain that the Coordination Mechanism Circumplex Model (CMCM, Fig.4.1) is a viable framework for coordination theory and research.

To establish the construct validity of the model, we conducted an empirical study to test the applicability of the dimensions. Although the intensional definitions remain unclear, the intelligibility of the proposed dimensions was hypothesised to be distinct enough to apply them for comparisons and to categorise observed mechanisms in the CMCM (Fig. 4.1). The main hypothesis of our study therefore proposed coder agreement for different coordination mechanisms. If different coders agreed on the relative explicitness/implicitness and on the relative pre-process/in-process status of the various mechanisms tested, the intelligibility of the Coordination Mechanism Circumplex Model would be validated.

4.2 Empirical Applicability

In the study of intercoder agreement on the explicit/implicit and on the pre-process/in-process position of a coordination mechanism, the construct validity of the model is reflected in the dependency of agreement from relevant factors. The design of the study therefore took into consideration different levels of task difficulty (macro-, meso-, and micro- levels of human coordination) and different expertise levels of the coders (expert vs. novice). The latter factor was considered a compensating factor for the former. This meant that if not only the ratings of the novices resembled those of the experts on the easier tasks, but the experts reached more agreement than novices on the more difficult tasks, then the two proposed dimensions of the model (explicitness and timing) would reflect greater construct validity than a mere agreement score for all coders.

4.2.1 Study Design

The objects for the coding task were drawn from three sets of coordination mechanisms with varying levels of task difficulty (Table 4.2). The simplest task was the coordination of time and space in road traffic, potentially due to random

Table 4.2 The difficulty (3) × expertise (2) design of the coder-agreement study

Coder expertise	Low difficulty (macro-level): coordination of road traffic	Medium difficulty (meso level): group coordination by leadership substitutes	High difficulty (micro level): verbal interacts in group discussions
Experts (the three authors)			
Novices (sets of students)			

everyday occurrence and its broad, macro-level categories. The meso-level of complexity was the coordination of groups by leadership substitutes. The most difficult set was the process analysis of micro-level verbal interactions in group discussions.

We depicted road traffic coordination using the following six mechanisms (alphabetically): 'eye contact', 'road traffic laws', 'speed bump', 'stop signs' 'traffic lights', and 'yield-to-the-right'.

The theory of substitutes for leadership (Kerr and Jermier 1978) was utilised for the medium level of coding difficulty. As touched upon earlier, this theory proposes that certain attributes of the task, the group members, the group, and/or the organisation can serve as neutralisers or substitutes for actions of group leaders. From the list of substitutes we chose eight mechanisms: 'group cohesion', 'competencies of the members', 'expert roles in the group', 'information technologies', 'prescriptions, plans, and formalisms', 'professionalism of actors', 'task-inherent feedback', and 'task structure'. The 'executive manager' was added as the ninth mechanism in this set.

As the domain with high difficulty, we chose the category system designed for micro-level process analysis of verbal coordination in decision-making groups by Kolbe et al. (MICRO-CO; see Chap. 11 and Kolbe 2007). The categories are ordered hierarchically (see Fig. 11.1). On the subcategory level, seven content-related acts (verbally conveying information, opinions, etc.) and 23 coordination acts are distinguished. Are the dimensions of implicit/explicit and pre-/in-process coordination applicable to non-coordinating content acts of communication? We decided to retain these content categories in the analysis because we were curious about their plotted location in the CMCM (Fig. 4.1). Second, we anticipated it to be difficult to utilise the pre-process time dimension pole (pre- vs. in-process) for interacts that were generally all expected to take place during the discussion. Third, the intended difficulty in coding the mechanisms of MICRO-CO (Fig. 11.1) was based on the richness in details of such a micro-level system. For example, MICRO-CO distinguishes seven types of questions. We were curious to see whether they would cluster in a small region or disperse all over the CMCM.

4.2.2 The Coding Task

An absolute coding judgment (e.g. "This is a pre-process mechanism") seemed unreasonable for dimensions lacking an intensional definition and socially shared anchoring points. Additionally, a simple cognitive anchoring of said judgments contradicts the notion of continuity of a circumplex. For example, a traffic sign restricting the speed limit to 30 km/h affects traffic participants more in-process than a prior learned rule to slow down in small villages. But do traffic signs act more pre-process than police stopping cars appearing unexpectedly at that location? With the history of psychological measurement in mind, we chose a pair-comparison task. The coders were instructed to consider a specific pair of mechanisms and decide (1) which of the two respective mechanisms was more explicit than the other and (2) which one was relatively more pre-process than the other. Because some paired mechanisms work equally well on either of the two dimensions, we allowed for equality judgments. In those cases, however, we asked the coder to specify the tendency of both mechanisms on the axis in question. Figure 4.2 shows a section of instructions for the first coding task on road traffic (simplest task level). Three of the 15 pairs of road traffic mechanisms were used as examples in the instructions and therefore omitted from the raw data results.

The $m^*(m-1)/2$ pairs in the medium-difficulty set of $m = 9$ leader substitute mechanisms resulted in 36 trials per dimension.

Pairs of all categories in MICRO-CO (Fig. 11.1) would lead to too many trials for an expected mean motivation of a novice participant. We therefore divided the category system of MICRO-CO into three subsets: Subset A encompassed the seven content-related subcategories and the five remaining second-level categories (from ‘addressings’ to ‘interruption’). These 12 mechanisms formed 66 pairs. Subset B contained the two subcategories of ‘addressings’ and the six subcategories of ‘instructions’ and the four remaining second-level categories (from ‘structurings’ to ‘content-related statements’; see Fig. 11.1), also resulting in 66 pairs. Subset C included the six subcategories of ‘structurings’ and the seven ‘questions’ plus the four remaining second-level categories, resulting in 136 pairs for each dimension.

Instruction: Please compare two (vertically arranged) mechanisms: Write down in each of the four cells per dimension one alphabetic character per row (see the first examples). Sometimes you might be unable to differentiate the two mechanisms on one dimension, as the example of the road traffic law and the traffic light in the explicit/implicit dimension. In that case, the same character: here *e* & *e* for ´both equally explicit´ could be used. But try to differentiate when possible. Please: Compare each pair of mechanisms separately: Which one coordinates traffic participants more explicitly, which one more implicitly than the other one? Which one coordinates the participants more likely pre-process, which one likely not until in-process?

… coordinates traffic participants	explicit	implicit	pre process means before process	actual, in-process
road traffic law	e		p	
traffic light	e			a

Fig. 4.2 The last section of the instructions for the first set of mechanisms

4.2.3 Coders and Procedures

According to the design of the study, agreement among the expert coders was to be compared with agreement among the novices. The three authors of this chapter served as the expert coders. We recruited nine university students at a psychology lecture on group coordination to function as the novice coders. The novice coders were divided into three groups of three members in order to ensure that the agreement scores for the expert and novice coders were statistically comparable.

Novices were instructed on how to categorise coordination mechanisms in the models dimensions with a page and a half of instructions (including Fig. 4.1 and ending with Fig. 4.2). Each novice coder worked on all three levels of task difficulty – always in the fixed order given in Table 4.2. This meant that the road traffic coding task had to additionally function as experience for subsequent coding of the leadership substitute mechanisms. With this accumulated experience, the novice coders were then assigned to code subsets of the verbal MICRO-CO interact categories. With this procedure, the first-level road traffic set and second-level leader substitutes set were coded by all nine student novice coders and analysed in three triads. This procedure also meant that each of the three subsets of MICRO-CO interacts (see Sect. 2.2) was coded by only three of the nine students.

The expert coders worked in the same sequence on the same material, but, unlike the novice coders, they answered all three subsets of the MICRO-CO task.

It is noteworthy that without being surveyed, all coders – experts and novices – reported the task to be very difficult, minimally indicating that they took their task seriously.

4.2.4 Dependent Measures and Statistics

As pair comparisons yield nominal data (see the first pair comparison in Fig. 4.2), we computed kappa coefficients utilising the formula of Fleiss (1971). Computations for the three levels of coding difficulty, for each dimension of the model, and for each mechanism (sub)set resulted in 28 kappa coefficients.

Additionally, each mechanism was plotted on the circumplex model axes by aggregation of all $(m - 1)$ codes per mechanism received by one participant (with m = number of exemplars per set). The sum of codes for explicitness was subtracted from the sum of codes for implicitness, and the sum of codes for pre-process was subtracted from the sum of codes for in-process coordination. Location of plotted scores ranged between $\pm(m - 1)$ per set of mechanisms and was regarded as interval scaled. The agreement within a three-subject group per dimension was estimated by Cronbach's α, an agreement score for interval scaled data again resulting in 28 coefficients.

4.2.5 Results

As visible in Figs. 4.3 and 4.4, coding agreement in both dependent variables (kappa for the raw data binary decisions and Cronbach's α for the scaled position on the axes) was higher for the base-level set of traffic coordination mechanisms than for the meso-level set of leadership substitutes, and lowest of all for the most difficult coding level of MICRO-CO verbal interacts.

Although according to strict statistical logic, an agreement score (kappa or alpha) is not additive, we regressed the 28 scores on the dummy-coded design factors based on the difficulty level of the set, the binary expertise of each three-person coding group, and then on the interaction of these two factors to test for compensation between the expertise level of the coders and the difficulty level of the tasks. The results confirmed the expected compensatory interaction (Fig. 4.5).

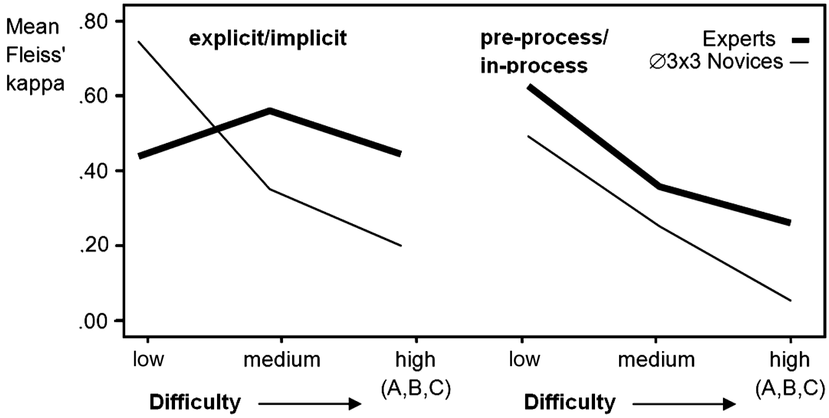


Fig. 4.3 Agreement in the coding of each mechanism in each pair comparison (kappa)

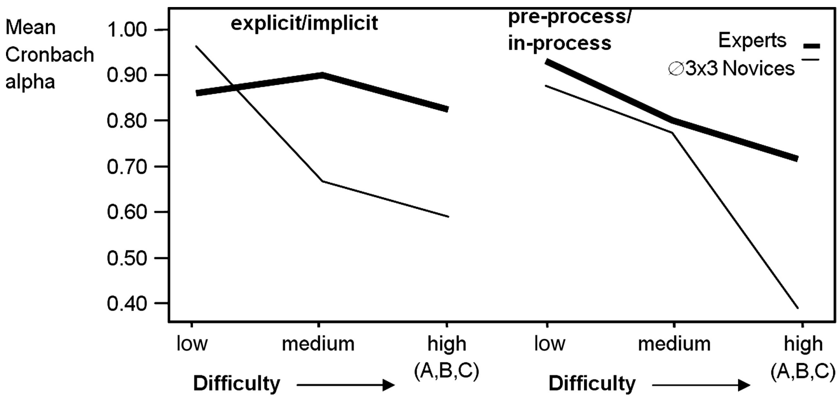


Fig. 4.4 Agreement in the dimension location of each mechanism (Cronbach's α)

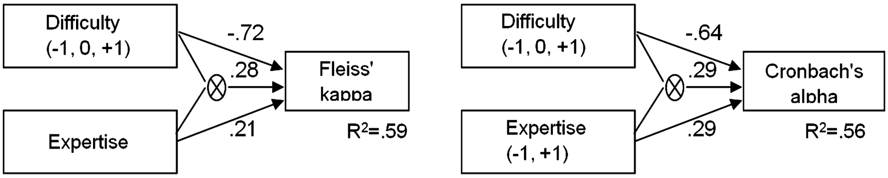
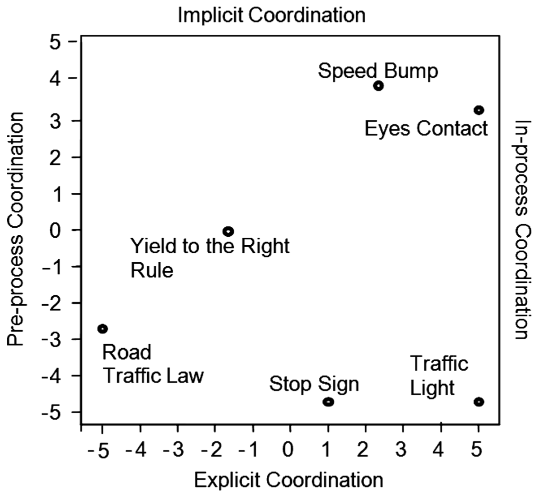


Fig. 4.5 Agreement regressed on difficulty of the set, coder status, and their interaction

Fig. 4.6 Location of the traffic road mechanisms (coded by three experts)



For raw decisions (kappa): $\beta = +0.28$, $t = 2.08$ $p < 0.05$; for locations of the dimensions (alpha): $\beta = +0.29$, $t = 2.02$ $p = 0.05$; confirming that the expertise of coders compensated for the difficulty of the coordination domains.

Coding among the novice group was in as high agreement as that of the expert coders for the road traffic mechanisms (mean kappa = 0.59, mean alpha = 0.91). As expected, novices failed to reach agreement on the verbal interacts of MICRO-CO (Fig. 11.1): they reached mean kappa = 0.13 in raw data, and mean alpha = 0.49 on dimensions, whereas experts reached mean kappa = 0.35 in raw data, and mean alpha = 0.77 on dimensions. Therefore, the plotted location results of the expert triad are valid for reporting.

The mean location of the road traffic coordination mechanisms (as coded by the experts) is depicted in Fig. 4.6. Each of the six mechanisms was involved in five pairs, the axis ranging from −5 to +5. The explicit mechanisms of 'traffic light' and 'stop sign' reached perfect agreement among the experts. The 'yield to the right' rule evoked the highest relative level of disagreement (Euclidian distances between its locations) found among the expert coders: One of the expert coders considered the 'yield to the right' rule as explicit and pre-process functioning, another expert regarded it as explicit and in-process functioning, and the third perceived it as an implicit and pre-process functioning mechanism.

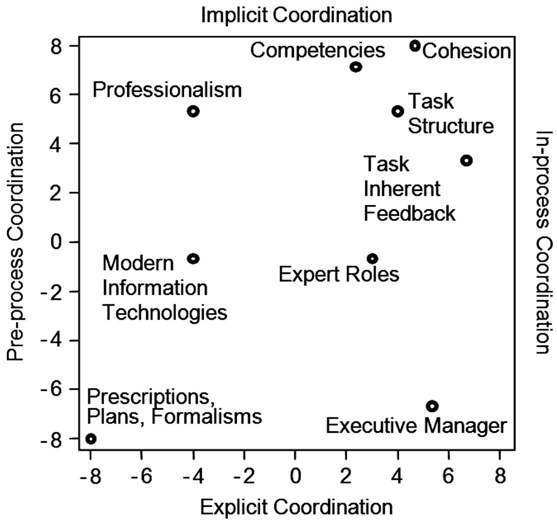


Fig. 4.7 Location of the leadership substitutes (coded by three experts)

Figure 4.7 shows the experts' mean plotted location of the leadership substitutes – the meso-level coding task. Only the substitution by 'prescriptions, plans, and formalisms' obtained perfect agreement as a maximum pre-process and explicit coordination mechanism. However, 'professionalism of persons' (on both dimensions) and 'task-inherent feedback' (on the implicit/explicit dimension) had the least agreement.

To reintegrate the three subsets of the verbal interact categories of MICRO-CO, a main component analysis with pairwise data inclusion was calculated in order to estimate the standardised positions for the six mechanisms intersecting two of the three subsets. A regression of the mechanisms of each subset and dimension on these main component scores standardised all mean plotted locations of the various verbal coordination interacts. Therefore, the axes of these means (Fig. 4.8) appear as z-transformed scores.

The categories of verbal interacts were widely distributed over the circumplex rather than clustered in any concentrated region (see Fig. 4.8). This result demonstrates the relativity or reference-system dependency of the axes and, for the coders, a rather deep understanding of the CMCM dimensions. At a macro-level perspective, all the micro-level categories of verbal interaction can potentially be coded as explicit and in-process. Within the reference system of micro-level interacts, the three expert coders agreed most consistently on some pre-process explicit mechanisms such as 'giving instructions' (a second-level category of the category system; see Chap. 11) and on the first-level category of 'defining a goal', a structuring activity. It also was strongly agreed that 'interruptions' function plainly as in-process and that 'comments' and other content utterances coordinate the group discussion implicitly.

Taken together, the three difficulty levels of coordination mechanisms – the most difficult at least by the experts – were understood in terms of the dimensions of

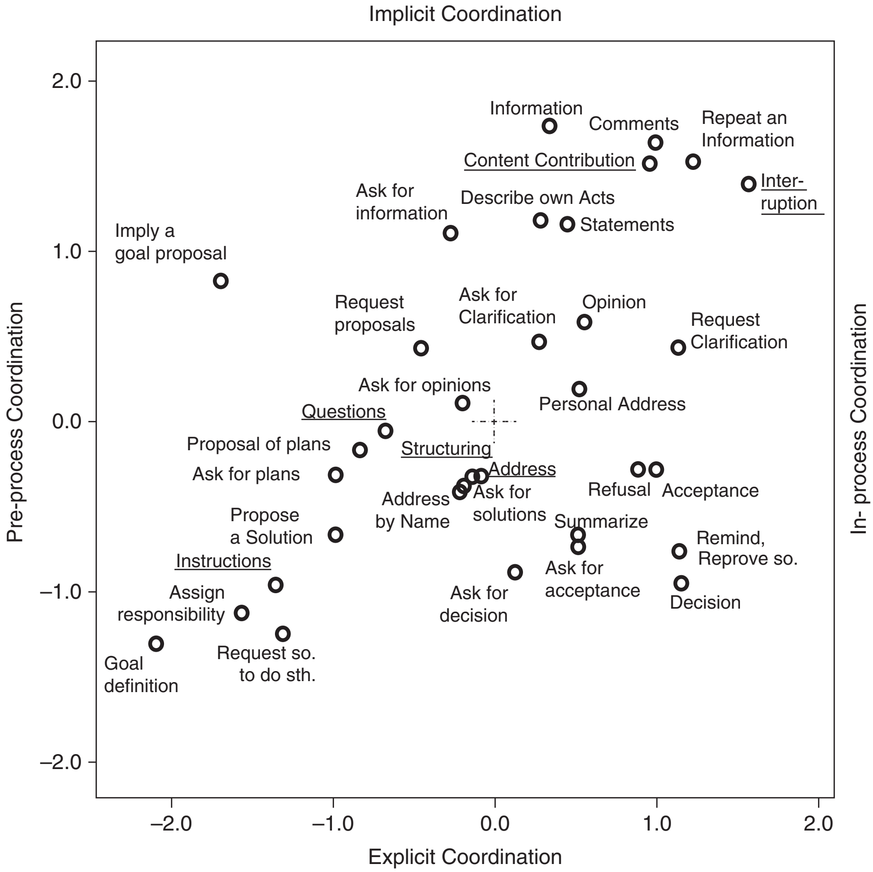


Fig. 4.8 Location of categories of verbal interacts (see Fig. 11.1; second-level categories underlined; coded by three experts, standardised by six exemplars intersecting the subsets)

the model. Intelligibility as a first validity criterion allowed a grounding plot in the quadrants of the CMCM. One of the validated features of this CMCM test is that the plots allow a scientific communication of the multi-dimensional and circumplex nature of coordination mechanisms.

4.2.6 Discussion and Outlook

In this chapter we examined the applicability of the two coordination mechanism dimensions of explicitness and timing adapted from Wittenbaum et al. (1998). Releasing the restriction of absolute judgments and allowing for relativity due to reference system dependence using pair comparisons, the three expert coders reached acceptable agreement for assigning coordination mechanisms to these two dimensions (kappa = 0.53, 0.46, 0.35 on decision's raw data; and Cronbach's $\alpha = 0.90, 0.85, 0.77$ on dimension locations for the least difficult, medium, and most difficult set, respectively). The novice student coders, on the other hand, matched the experts' agreement level on the easier set but failed to agree on the coordination mechanisms of the more difficult levels. Nevertheless, the hypothesised compensatory interaction of task difficulty and coding expertise was statistically established as illustrated in Fig. 4.6. Thus, despite of the lack of intensional (and therewith producer/target) definitions of the dimensions discussed in the Introduction, experts acquainted with the observation of coordination mechanisms at different levels of social systems (e.g. in organisations from a macro-level point of view), in groups from a medium level, and within a single discussion in a micro-level attitude managed to cope rather well with the model. Experts in group coordination were able to decide the relative pre-process versus in-process influence as well as the relative amount of implicitness versus explicitness of two given mechanisms within the context of a mechanism set reference system. However, our results also illustrate the necessity to code mechanisms by more than one expert in order to achieve the desired level of reliability and robustness of results. This rather cumbersome and time-intensive procedure needs to be maintained until clear and intelligible intensional definitions are formulated.

Our main observation is a reconfirmation that coordination is executed on different levels of interaction: the macro-, meso-, and micro- level, respectively. But because we also have learned that switching cognitively among these levels can lead to qualitative changes in the meaning of pre-process and in-process or implicitness and explicitness, questions remain regarding a characterisation process for intensional and perspective aspects of coordination mechanisms. Our tentative solution is to adhere to the pair-comparison approach within a reference set of mechanisms until these questions are resolved.

Secondly, our test helped to illustrate the unsolved question that perspective of coordination mechanisms (producer vs. target) was ignored in former literature on the CMCM. To pique a discussion of this problem, our injection of the component of varying levels of coordination complexity as an attribute of the reference set of coordination mechanisms seemed to have helped. For coordination of large-scale human social systems (macro-level), the usual research focus is the so-called architecture of control (Lockton 2005), where the intention of the producer becomes the salient position. Pre-process and explicit versus in-process and implicit mechanisms seem the obvious prototypes, being well understood from the producer's perspective, perhaps because it's easy to identify with Lockton's *controller* when analysing macro-coordination. However, even in the road traffic set, we chose not to apply the perspective of the producer. Speed bumps, a typical design artefact explicitly intended by their producer to slow down traffic, were coded as an implicit in-process mechanism (see Fig. 4.6). Speed bumps appear to be implicit and in-process functioning if viewed from the perspective of the target of the mechanism. In terms of intentionality, targets (in this case: drivers) adaptively slow down mainly to secure their cars and their comfort. In other words, low motivation to comply with traffic road laws would not change their actual driving behaviour when faced with a speed bump due to the overriding risk to their car and their comfort. This helps explain why explicit coordination mechanisms from the perspective of the target generally need the target's compliance (a weaker form of intentionality) in order for the mechanism to be executed in the first place. Is it this freedom not to comply that makes a coordination mechanism explicit (and in our speed bump scenario, 'implicit' because the targets' reduced speed has nothing to do with intended compliance to the speed limit) and also explains why some explicit mechanisms might work less than perfectly? But the effectiveness of a mechanism does not necessarily bias its positioning in the coordination circumplex (Fig. 4.1). From the perspective of the target, implicit mechanisms can carry a higher compliance risk (and, in some cases, a correlating compliance motivation) because the target is free to overlook them, but at the peril of their car or worse in our example.

We also observed that both task structure and task-inherent feedback as leadership substitutes in teams also function implicitly and in-process (see Fig. 4.7). Similarly to the speed bump coordination mechanism, they both seem related to the perspective of the target. The implicit in-process quadrant of the coordination mechanism circle looking at the micro-level (Fig. 4.8) is filled with content contributions. Content does not convey normative information, but implicitly changes the micro-level knowledge environment and task for thoughts and acts. Content contributions may function as a 'neighbour thought', evoking 'self-coordination' in discussions. No explicit intentions are needed to evoke the changes these content contributions make to the ongoing group process.

Harkening back to the landmark of Jones and Gerard (1967) behaviouristic model of three types of interaction patterns, pseudo-contingent behaviour (rooted in a third information source) is caused by such in-process implicit mechanisms as in the rhythm of music for dance movements, speed bumps for car drivers, and task structures and/or actual content of an ongoing discussion. The implicitness of these mechanisms is unrelated to producer intention even though the music may have been chosen by a disc jockey, the speed bumps planned by city traffic management, and even the task structure of an ongoing discussion carefully designed by symbolic leadership (Schein 1992). It is even conceivable that interruptions and repetitions are sometimes produced intentionally to control the discussion (Kolbe and Boos 2009). But from the perspective of the coping individual (the target's perspective), their adaptations to affordances of the mechanisms in all three scenarios are uncorrelated to the existence of manipulation (producer) intentions. The discussion of mechanism intentionality and perspective seems like a bottomless pit. In the discipline of semiotics, objects with a *major pragmatic* function (judged from external perspective), even if accomplishing a *minor semantic* function (from target and external perspective), are distinguished from signs with a *major semantic* function (semantic specialisation, e.g. Nöth 1995, pp. 156, 441), as biosemiotics by definition excludes external attribute intentions of non-human animals and plants. Analogously, according to the mechanism's functional specialisation, explicit mechanisms realise coordination as their major function (external perspective), whereas implicit mechanisms lack this functional specialisation. Task-inherent feedback and content contributions from the targets' perspective seem functionally unspecialised regarding their coordination realisation. But what about speed bumps, with an explicit functional intent from the producers' perspective but an implicit coordination realisation from the targets' perspective? Even though the CMCM is neutral regarding perspective considerations, we contend that the targets' perspective as the reference point for the external coordination realisation is more reflective of the actual affects of the coordination mechanisms (see Figs. 4.6–4.8). Following these considerations, explicitness means *accomplishing a major coordination function*: An explicit coordination mechanism possesses specialisation; an implicit coordination mechanism does not.

Additionally, the functions of coordination mechanisms can change over time: Some mechanisms can continuously specialise themselves for different functions, and therefore change their temporal (pre-/in-/post-process) dimension location as well as their explicit/implicit dimension location in the CMCM quadrants (Fig. 4.1).

This lack of clarity regarding the theoretical status of the 'intention' construct and how it affects coordination realisation, especially in the context of non-human primate group coordination, has generated several questions for further theory building and empirical research. Small group research should continue to develop a convention of the implicit/explicit and pre-process/in-process mechanisms for different complexity levels and forms of coordination processes. This is absolutely essential if we are ever to hope for consensus among researchers from different backgrounds and disciplines regarding a fully functional characterisation model of coordination mechanisms of both human and non-human primate groups. It is also important that questions regarding producer vs. target perspective relative to the two coordination circumplex dimensions are further researched and eventually accounted for in such a model. For instance, if a coordination mechanism is defined as explicit due to the intention of a producer, but as implicit due to going unnoticed as such by the target, yet nevertheless as a successful coordination mechanism due to its asserted effect on the target's behaviour (e.g. our speed bump scenario), its plotting on the CMCM becomes split. Two circles would be needed in order for the CMCM to accommodate the plotting of this scenario: one for the controller, one for the target. In such scenarios we prefer the perspective of the target because this perspective represents the actual realisation of the mechanism.

Then there are questions evoked by temporality that need to be addressed. The CMCM distinguishes pre-process and in-process phases. Two interpretations are potentially applicable: (1) the onset timing of a coordination mechanism and (2) the durability of its effectiveness, or 'power'. Consider the basis of power (Raven 1965) as a set of coordination mechanisms on a meso- or macro-level. Raven (1999) later considered the durability of power based on 'information' as longer lasting and having more sustainable effects without in-process surveillance compared to other power bases such as assertion of authority. In our study of verbal acts, content contributions (statements, comments, information), if identified as coordination mechanisms, were coded as relatively implicit and in-process coordination (Fig. 4.7). But requests, goal definitions, and implications of goals were plotted on the pre-process section of the micro-level CMCM because their effects are sustained over longer durations. Both aspects of temporality (onset and durability) seem to fit, depending on the macro- or micro- level of the coordination reference set.

We show in this chapter some data on the intelligibility and therefore applicability of the Coordination Mechanism Circumplex Model. But assessment of the overall *effectiveness* of the model is another matter. Yet even with all the above-mentioned caveats requiring additional clarification and study, we nevertheless believe in the applicability of the CMCM as a helpful model when analysing the timing and explicit/implicit descriptions of coordination in both human and, potentially, non-human primates.

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