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Title: Command approach: Problem bounding vs Problem solving in Mission Command (Paper 176)

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Author: Keith Stewart
Adversarial Intent Section, DRDC Toronto, Canada

Point of Contact: Keith Stewart
Influence and Effects Group
Adversarial Intent Section
DRDC Toronto
1133 Sheppard Avenue West
PO Box 2000
Toronto, ON M3M 3B9
CANADA
Tel: 416-635-2130
keith.stewart@drdc-rddc.gc.ca

Abstract
For the command researcher, there is a rich seam of anecdotal, historical and documentary evidence to be mined on the topic of command philosophy. However, relatively few applied scientific analyses have been conducted in this area. This paper draws upon a review of a limited number of experimental and survey studies in an attempt to find evidence of a difference in command philosophy based on national organisational culture: specifically, the 'problem solving' / 'problem bounding' distinction drawn by Alberts and Hayes. Studies conducted independently in different nations that have examined the content of commander's intent (CI) statements were reviewed. In addition, studies examining the effectiveness of transmission of CI in experimental settings were reviewed. The aim was to look for evidence suggesting written orders are to be considered directions that should lead subordinates to find a single set solution (problem solving), or alternatively, are intended to set boundary conditions within which individuals are free to seek an optimal solution (problem bounding). Broad similarity in how CI is expressed was observed; however some evidence consistent with a problem solving / bounding distinction was found.

Introduction
The command approach adopted within a military organisation, and in particular the extent to which a commander will provide explicit direction to subordinates, is dependent upon a range of factors including organisation culture and command philosophy, experience, training, and the risk inherent in the specific situation that the orders are designed to address. The successful establishment of common intent[1] is reliant upon a commander and his staff judging correctly the appropriate balance of explicit and implicit intent. In many cases, the explicit component of intent is transmitted by more than the orders document. For example, discussions at a commander's orders group or clarification sought via a liaison officer provide illustrations of extra opportunities for the transmission of explicit direction. Pigeau and McCann[2] have discussed at length how the proportions of explicit and implicit intent differ between centralised and decentralised command and control organisations. They propose that "…there are several possible solutions within the commander's intent. Even an end-state cannot be fully delineated and there are several paths to achieving it. The commander's intent is really a further bounded set of solutions". Stewart[3] drew upon this theoretical description to examine how a mature command organisation might vary the proportion of explicit direction it issued with a view to managing risk. The theoretical arguments provided by Pigeau and McCann and Stewart are in line with Alberts and Hayes' earlier description of a 'spectrum of Command and Control (C2) approaches' that ranges from the issue of regular detailed orders to a virtually control free approach to operations[4].

Alberts and Hayes proposed a C2 spectrum in which they distinguish between 'order specific', 'objective specific', and 'mission specific' philosophies. These discussions have focused on the levels of control centralisation and directive specificity in orders. 'Order specific' approaches tend to be adopted by command organisations that maintain centralized control and issue regular, detailed orders. The Chinese People's Liberation Army and former Soviet armies are cited as examples. 'Mission specific' approaches are at the opposite end of the scale and describe low levels of central control such as employed by the Israeli Army and the German Army in WWII. The centre of the spectrum is occupied by 'objective specific' approaches. Within this category Alberts and Hayes contrast 'problem bounding' and 'problem solving' approaches. They propose that 'problem bounding' directives are less detailed than those issued by commanders in 'problem solving' environments – "often by a factor of three to one, reflecting this lack of

detail". By contrast, problem solving approaches are characterised by a tendency to provide more substantial guidance as to how objectives are to be met.

Differences in command approach are of much more than academic interest. In an era where joint and combined operations have come to the fore and where multinational inter-working occurs at relatively low levels in the command hierarchy, such differences are potentially a source of 'friction'[5] between the contingents comprising the coalition or alliance force. For the command researcher, there is a rich seam of anecdotal, historical and documentary evidence to be mined on the topic of command philosophy[6]. However, relatively few applied scientific analyses have been conducted in this area. The discussion that follows draws upon a review of a very limited number of experimental and survey studies in an attempt to find evidence to support the observation that, whereas in some military organisations written orders are to be considered directions that should lead subordinates to find a single set solution (problem solving), in others they are intended to set boundary conditions within which individuals are free to seek an optimal solution (problem bounding)[7].

Studies examining the content of intent statements

Three complementary studies were reviewed that examined military orders, in particular the Commander's Intent (CI) statement, with a view to categorising the contents. Despite some methodological differences between these independent efforts, a comparison of their findings indicates general agreement as to the essential elements of the CI statement. The methods employed in each of the studies are described very briefly and then the findings are compared.

In the early 1990s, Klein and a group of his colleagues conducted studies examining the content of intent statements in US Army operations orders. Kaempf, Klein, and Kyne[8] worked with military Subject Matter Experts (SMEs) on an examination of CI statements that were generated during Brigade and Battalion field exercises at the US National Training Center. Based on analysis of 35 such statements, Klein[9] proposed a basic structure for the CI statement. He identified 7 components, which he refers to as 'slots':

- Purpose of the mission – higher level goals
- Mission objective – image of the desired outcome
- Plan sequence
- Rationale for the plan
- Key decisions
- Anti-goals
- Constraints and considerations

Klein later re-analysed the 35 CI statements breaking them down into small sentence or paragraph-sized text blocks that each "referred to a separate and distinct concept." He then allocated each of these text blocks to one of the seven slots. This enabled him to assess how many of the 35 statements contained information from each of the 7 slots; the maximum score for each slot was therefore 35. It is assumed here that the slots that are used more frequently are generally the more important.[10]

Murphy[11] surveyed 76 serving Australian Army Officers asking them to rate the importance of each of Klein's seven CI slots on a 6 point response scale that ranged from 'very low' to 'critical'. In this study, an eighth slot, entitled 'mission objectives', was

added at the request of ADF SMEs. It appears that Klein sees 'image of desired outcome' and 'mission objective' as part of the same construct, while the ADF experts who worked with Murphy made a distinction between the two.

Molloy, Blendell, Pascual, and Campbell[12] conducted a questionnaire survey of 103 serving British military personnel most of whom were Army officers. Participants were asked to identify information that they believed should be included within commander's intent and then to indicate the relative importance of the information categories they generated. The results of the three studies are compared in Table 1, which shows the derived ratings of importance of the commander's intent slots[13]. Klein's 'Mission objective – image of the desired outcome' slot has been treated as two separate categories in the table to enable comparison with the British and Australian studies both of which separated these categories. Both are ranked first and Klein's second placed category 'plan sequence' is moved into third place[14].

Components of the CI Statement (Murphy / Klein)	**Murphy (Aus)**	**Klein et al (USA)**	**Molloy et al (UK)**
Mission objective(s)	1	1	2
Clear image of the desired outcomes	2	1	1
Purpose of the mission	3	7	4
Plan sequence	4	3	3
Key decisions	5	6	
Constraints and considerations	6	5	7
Rationale for the plan	7	4	
Anti-goals	8	8	

Table 1: A comparison of studies rating the importance of components of commander's intent

The table, which is necessarily speculative owing to the differences between the studies, does indicate a reasonable degree of consistency between the results of these three studies. Categories relating to objectives and end state occupy the top two positions in all three studies. These are followed by slots associated with the plan and the reasons for the mission, except in the US study where relatively little information associated with higher-levels goals ('purpose of the mission') was found in the CI statements examined. A more detailed discussion is provided in Stewart[7].

Perhaps the most interesting difference in the results of the studies relates to the 'purpose of the mission' slot where the Australian and UK studies are given ranks of 3 and 4, respectively, for this category while the US study is given a rank of 7. Klein points out that, although US Army practice dictates that commanders should understand the plan two levels up, only 8/35 CI statements provided information regarding the higher-level goals. Clearly the statements were generated in a training environment, however if it is the case that this finding is representative of actual practice, how can it be interpreted? Given the problem bounding / solving hypothesis, it seems possible that a failure to set orders in the broader context of the mission is indicative of a tendency to a directive style of control owing to the redundancy of contextual understanding for subordinates with few degrees of freedom. Klein observed that information relating to the plan itself accounted for more than a third of the overall content of the 35 statements. He noted that since the plan is expressed elsewhere in the orders document, there is little reason to devote so much space to it within the intent statement. These findings seem to indicate a tendency in the orders documents examined for commanders to augment information about objectives and desired outcome with information about the plan that specifically adds directive control of action.

In this regard it is interesting to consider the responses to one question in a survey study on doctrinal understanding conducted by Firth[15]. He asked 30 British and 30 American Army officers to rate which was the most important to them as a commander: the designated task, the designated purpose, or the higher commander's intent. Over 80% of UK respondents chose CI and none chose the task. In contrast, only 40% of US respondents chose CI with roughly 30% choosing the task and 30% the purpose. Interpretation of this result is complicated and can only be speculative. However, in view of Klein's findings, it may reflect a tendency for US commanders to be more focussed, on average, on the specifics of the plan than their British equivalents. Moreover, if Klein's findings regarding the content of intent statements are valid, it is possible that the US and British respondents in Firth's study had a different appreciation of what CI implies. In this regard, US respondents may be used to finding the plan-specific information that is central to a 'problem solving' approach throughout the orders document, including the CI statement. UK respondents, on the other hand, requiring information on their commander's higher level goals to delineate a problem boundary, would focus on the CI statement.

In comparing the results of his study with Klein's earlier work, Murphy speculated that where differences were seen a major factor underlying the type of difference observed is likely to be organisational culture. Thus, there is the intriguing possibility that the pattern reflects a real difference in the way intent is expressed by the Australian and British samples compared with the Americans. This would be in line with speculation on the differences in the specificity of guidance provided to subordinates in these three styles of mission command and the tendency to 'problem bounding' rather than 'problem solving' in the Australian and UK samples. Moreover, this would be consistent with the framework put forward by Alberts and Hayes who argued that problem bounding is consistent with UK doctrine. They point out that although UK HQs provide directives based on objectives to be accomplished they tend to present them in very general terms (it is suggested here that this approach is broadly equivalent to that adopted in the Australian Army). Alberts and Hayes further suggest that, by contrast, the US Army has adopted a 'problem solving' approach since WWII.

Stewart[16] reviewed several studies that employed methods for assessing the compatibility of subordinate commanders' intent with that of their superiors. He noted that, while similar terms were used by the investigators to describe the aims of their studies, they sometimes appeared to be examining subtly different aspects of intent. One explanation was that the philosophy of command of the organisations involved in these studies had an effect on the assumptions that underpinned the way the individual studies were conducted. Specifically, it was noted that while some investigators appeared to regard a statement of intent as an indication of a boundary for subordinates to work within, others saw the intent statement as guidance designed to elicit a particular solution. In this case the different assumptions were reflected as much in the experimental methods themselves as the results.

For example, in a ground-breaking command experiment conducted by Shattuck[17], US Army company commanders were tasked to develop orders in response to a battalion operation order. The battalion commanders, who had written the original orders, were then asked how they expected the company commanders to respond to two separate updates to the tactical situation. In effect, battalion commanders were asked to judge whether subordinates' responses matched their own proposed course of action. This is different from asking them whether or not subordinates' responses were within the broad bounds of CI. The assumption appears to be that the orders process should promote homogeneity of decision making between echelons. For example, "imparting presence is the process of developing subordinates' decision-making framework so they would respond the same way the senior commanders would if they were able to view the situation through their eyes" (p 72). This variant of decentralised command has substantial advantages, for example it has the potential to promote co-ordination and to reduce risk. On the other hand, it might be argued to suppress subordinates' creativity within their broad appreciation of CI. In terms of Alberts and Hayes' C2 spectrum discussed earlier this approach appears to be indicative of a 'problem solving' philosophy.

Conclusion

The studies reviewed in this paper seem to provide some support for Alberts and Hayes' observation that US and UK armed forces tend to adopt 'problem solving' and 'problem bounding' approaches to command respectively. A sample of US Army operations orders was judged by Klein to contain relatively low levels of information associated with high level goals and - in his view - an inappropriately high proportion of plan-related detail. By contrast, respondents to British and Australian surveys rated high-level goals to be an important component of commander's intent but rated details of the plan to be of relatively low importance in that section of the orders document. Shattuck's findings imply that, in an exercise, subordinate commanders were not deemed to have prepared an appropriate solution to a military problem unless it matched closely that prepared by their immediate superior. This also supports the view that in the US Army's approach to command, CI is a route to a particular solution rather than an indication of boundary conditions within which subordinates are expected to work. Although this interpretation of the results and conduct of the studies reviewed has been argued to provide evidence that supports Alberts and Hayes' distinction between problem solving and problem bounding, this interpretation cannot be argued to be conclusive. Rather, the intention of this paper is to provide a starting point for further applied scientific studies in this area of command research.

Most importantly, there is no suggestion here that either of these approaches to command is superior. These command cultures have evolved to suit the organisations concerned in terms of their personnel and the operations they have conducted or trained for. As is discussed in Stewart[3] it is easy to overlook the considerable investment in time and resources associated with establishing and maintaining an organisational culture of mission command and training personnel at the high standards required to operate within such a paradigm. Deciding how command is to be exercised is a function of command. The way command is exercised must take into account those under command. In an era where understanding the culture of adversaries and neutral populations is, quite rightly, heavily emphasised, we should not forget the importance of understanding the organisational cultures of alliance and coalition partners.

References

[1] Pigeau, R., & McCann, C. (2000). Redefining Command and Control. In C. McCann and R. Pigeau (Eds.), *The human in Command* (pp. 163-184). New York: Plenum Press. Pigeau and McCann emphasise that co-ordinated action is dependent upon the establishment of common intent which they define as "the sum of shared explicit intent plus operationally relevant shared implicit intent." The same authors define intent as "an aim or purpose along with all of its associated connotations".

[2] Pigeau, R., & McCann, C. (2006). Establishing common intent: The key to co-ordinated military action. In A. English (Ed.), *The operational art: Canadian perspectives. Leadership and command* (pp. 85-108).Kingston, Ontario: Canadian Defence Academy Press. In this publication, Pigeau and McCann stress that "intent includes an explicit portion that contains the stated objective…and an implicit portion that remains unexpressed for reasons of expediency but nonetheless is assumed to be understood."

[3] Stewart, K. G. (2006). Mission command: Elasticity, equilibrium, culture, and intent. DRDC Toronto TR 2006-254.

[4] Alberts D. S., & Hayes, R. E. (1995). Command arrangements for peace operations. Washington DC: CCRP Publications Series.

[5] Stewart et al proposed that command style was one of a class of factors with the potential to affect what they referred to as 'non technical interoperability' (NTI) in multinational forces. Drawing on van Creveld's ideas, they suggested that low NTI can result in Clausewitzian friction in a complex military force. Stewart, K., Clarke, H., Goillau, P., Verrall, N., & Widdowson, M. (2004, September) Non-technical interoperability in multinational forces. Proceedings of the 9th International Command and Control Research and Technology Symposium, Copenhagen, Denmark.

[6] For example, Oliviero's excellent thesis on Auftragstaktik is particularly valuable. Oliveriero, C. S. (1998). The Early development of Auftragstaktik. Unpublished MA thesis, Royal Military College of Canada.

[7] For a more detailed discussion see Stewart, K. G. (in press). Mission command: Problem bounding or problem solving? Canadian Military Journal.

[8] Kaempf, G. L., Klein, G. & Kyne, M. (1993). A study of how field commanders express their intent. Klein Associates Inc., Fairborn, OH.

[9] Klein, G. (1993). Characteristics of commander's intent statements. Paper presented at The Symposium on Command and Control Research, Washington, DC, USA

[10] It is notable that Klein does not state explicitly that the most frequently used 'slots' are the most important. However, he does point out in his conclusion that, given the need for concise statements, some slots may be omitted altogether where they wouldn't carry sufficient value.

[11] Murphy, P. J. (2002). Forays into command intent: Assessing the components of intent statements and developing a methodology for measuring shared intent. DSTO-TN-0471.

[12] Molloy, J. J., Blendell, C., Pascual, R. G., & Campbell, A. (2003). Understanding and supporting the effective formulation, dissemination and interpretation of commander's intent: Final technical working paper. QINETIQ/KI/CHS/TWP030136/1.0.

[13] It should be reiterated that Klein does not state that the frequency counts in his study were indicative of importance. For the purposes of the current paper, Klein's frequency data are interpreted as being indicative of importance, to enable a comparison to be made between the three studies reviewed.

[14] The study by Molloy et al generated different, but broadly equivalent, slot compared to those used by Klein and Murphy. In order to facilitate comparison, Klein's terms are used in the table.

[15] Firth, A. D. (2003). United in fact? A critical analysis of intent and perception in the application of American and British Army doctrine. School of Advanced Military Studies, Ft. Leavenworth, Kansas, USA.

[16] Stewart, K. G. (2008). Measurement of intent: A selective review of the literature. In: J. Stouffer & K. Farley (Eds.) Command intent: International perspectives and challenges. Kingston, ON: CDA Press. The Technical Co-operation Panel.

[17] Shattuck, L. G. (2000, March-April). Communicating intent and imparting presence. Military Review.