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SPEECH ACTS OF WAR

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ABSTRACT

The British Army currently embraces a manoeuvrist style of command and hopes to gain further operational advantages from Network Enabled Capability (NEC) and effects-based planning (EBP). Many new communications equipments are being procured. Existing approaches to military simulation modeling have, for good reasons, not concentrated on command and control (C2), but this is now changing. The author proposes an approach to the modeling of military command systems based on Searle's theory of speech acts, and suggests that it may have broader application than modeling C2 alone.

1 INTRODUCTION

The present research is part of project 11.1 in the Defence Technology Centre for Data and Information Fusion (DIF DTC) funded by the British Ministry of Defence (MoD). Project 11.1 focuses on assessing the military usefulness of autonomic communications networks, and has recently completed its first year.

The British Army is currently much exercised with the idea of "Network Enabled Capability" (NEC), which corresponds to at least some aspects of what the US military calls "Network Centric Warfare" (NCW) (MoD NEC home page 2004). On both sides of the Atlantic, there is much talk of effects-based planning (EBP), coalition warfare and jointery.

The jaundiced veteran observer of defence matters might suggest that these matters are often discussed with more enthusiasm than clarity, but there can be little doubt that the emphasis placed by these discussions on the prime importance of command control is simply right. It will also be readily accepted by those attending the Winter Simulation Conference that simulation studies are a good and useful thing to do, and can help us learn a great deal about proposed systems more cheaply and more safely than experimentation with the real thing.

Unfortunately, it seems that there is currently considerable difficulty in approaching the questions raised by NEC and EBP using simulation modeling. One might at once object that it is not reasonable to expect worthwhile simulation work to be done until the concepts to be studied have been clarified to a greater extent than is currently the case; to which I would respond that simulation modeling, appropriately used, can be a useful tool to assist in just such a clarification.

2 CATEGORIES OF MILITARY SIMULATION MODEL

2.1 Training and OA Models

Military simulation models can be seen as falling into two broad categories according to their intended use. The first category – and it seems to me the one that has received more attention and larger budgets in recent years – is that of training simulations, in which I include simulation models used for mission rehearsal. The second is what, being British, I call OA (Operational Analysis, meaning the same as Operational Research) simulations.

Training simulations exist to give a useful training experience to service personnel, typically in a synthetic environment that mimics as closely as possible the real environment in which they will be operating in "the real thing".

OA models exist to conduct studies (which we hope are methodologically and statistically sound) to support decisions such as which variant of a tank to buy, or to answer questions about the operational effectiveness to be gained by introducing some new item of equipment. In the UK, the most common use of OA models is probably in COEIA (Combined Operational Effectiveness and Investment Appraisal) studies.

2.2 Contrasts Between the Two Types

By their nature, training simulations must use models with high-fidelity graphical representations, include people in the loop, and must be "soft" real-time systems. With OA models, on the other hand, simplicity is a virtue and high-fidelity graphics are not needed (although animated graph-

ics can still be useful); people cannot be allowed in the loop, as repeatability is required by experimental rigour; and the models should run in fast time, so as to be able to run as many replications and treatments as may be needed. It also seems that training simulations tend to be continuous time simulations, whereas OA simulations are more often discrete-event; but this need not necessarily be so. The requirements of the two kinds of simulation are thus almost diametrically opposed, although this does not yet seem to have been realised by some enthusiasts for SEBA (Synthetic Environment Based Acquisition), which sometimes seems to demand the use of training-type models for OA purposes.

Both these kinds of model have been around for some considerable time. Flight simulators such as the Link Trainer already existed in World War 2, and stochastic simulation was one of the first uses to which electronic digital computers were ever put, before which studies were conducted by hand simulation. Despite the differences between them, both classes of military simulation have in common the fact that they have not in the past been expected to represent command and control (C2) in any great depth. Training simulations did not model C2 because the soldiers under training provided the staff work and command decisions. OA simulations did not model C2 because it would be a confounding factor from the point of view of a study intended to find, for example, the best balance of investment between tanks and anti-tank missiles.

2.3 New Emphasis on C2

There has in recent years supposedly been a change in emphasis from "attritionist" to "manoeuvrist" styles of warfighting (Simpkin 1985; Fitz-Gibbon 1995) and a switch away from a "platform-centric" to a "network-centric" focus (Alberts, Gartska and Stein, 1999). The magnitude of these changes is I think often exaggerated, and phrases like "network-centric" are not the most felicitous, but that there has been a change is clear. The new emphasis placed on the importance of C2 is evident both in the debate on "digitization of the battlespace" and in the equipment programme – Bowman, Falcon, Skynet V and Cormorant are all major telecommunications systems in the procurement pipeline now. If we are to produce simulation models that tell us anything useful about the digitized battlespace and the value of information superiority, then we need to be able to conduct OA analyses on C2 questions, and it is clear that pre-existing models are, for good reasons, not well fitted for the job, as they were never designed for it.

Classic OA combat models concentrate on the representation of detection and attrition. The things real armies spend most time doing are typically quite different from the things most military simulations spend time simulating. Having been a hobby wargamer for over thirty years, and having spent some time both participating in military exercises as a Territorial Army soldier and Officer Cadet in my youth, and more recently observing brigade and battlegroup HQs at work as part of my job, I still find this contrast striking. No doubt the many military men who are also simulationists have found the same thing.

In real life, much time is spent on what the British Army calls 'R' (reconnaissance) groups and 'O' (orders) groups. In headquarters, much of the staff's time is spent poring over maps, drawing things on overlays and doing what is known as "intelligence preparation of the battlefield" (IPB), a continuous process that informs planning. These things have traditionally not been represented in combat simulations. However, they are essential to the gathering and distribution of information. While it made sense to disregard C2 when conducting a study to support the procurement of (say) anti-tank weapons, this is no longer acceptable when the equipment being procured is for telecommunications and other support to command functions.

Classic telecommunications models represent traffic flows, but they are represented in the fashion of a "sausage machine" transporting packets or messages from one place to another – the informational content of these is nowhere measured by results expressed in terms of throughputs and end-to-end delays. Information is important in warfare, but information is not sausages. The point about information is that it informs someone; if you tell me something that I already know, or that is entirely irrelevant to me, then you do not inform me, no matter what bulk of material you may convey. A "sausage-machine" communications model may model communications, in the narrow sense, but it models neither command nor control.

Despite the clear shift in the topics of interest to military users, the approaches used in military simulation modeling in the UK seem to have been slow to change. This may be partly ascribed to the extremely large existing investment in simulation. Stewart Robinson (Robinson 2001) has pointed out, in his analysis of different styles of simulation practice, that military users tend more towards large, expensive and long-lived models than do civilian users of simulation modeling, and large and complex models make change more of a challenge.

2.4 A Possible New Approach

While I have a reasonable depth of background in military affairs and simulation modeling, my understanding of speech act theory is at the time of writing still slight. However, it seems to me that speech act theory may offer us a useful way of looking at C2 interactions in OA-type models. It should at least be an improvement of the lists of "information exchange requirements" (IERs) composed by C2 analysts, which resemble laundry lists both in their structure and, for purposes of understanding the process of command, their usefulness.

I am not aware of any attempts yet made to use speech act theory in simulation modeling; Cross and Bopping (Cross and Bopping 1998) provide the only example I have

yet met of applying speech acts to C2 studies at all. One-SAF will reportedly use BDI (Belief, Desire, Intention) agents written using JACK to command computer-generated forces (Park 2002), but the emphasis here still seems to be strongly on training simulation.

3 SPEECH ACT THEORY

The origin of speech act theory is normally credited to Austin (Austin 1962), although such matters had been a subject of debate among philosophers of language long before (Smith 1990). His ideas were considerably adapted by the American philosopher of language, John R. Searle (Searle 1969). A speech act is an utterance made which, if successful, changes the information state of the hearer. I should say here that I propose to take a broad view of the term "speech act", and intend to include also communicative acts using other media. Military command at division level and below is normally conducted by voice, whether face-to-face or by radio, but communication also occurs by written messages and sketch maps, and might also be accomplished by whistle blasts, bugle calls, or hand, flag or light signals. I see no reason to exclude these from our understanding of the category of "speech acts", although in some cases the meaning of a given signal will have to have been defined beforehand.

3.1 Kinds of Speech Act

One can distinguish five categories of speech act, which I list here with some examples having a military flavour, and discuss briefly. While Searle doubtless intended his theory to be completely general, military speech acts are likely to be considerably more formalized and more terse than those of everyday discourse. This I view as an encouraging factor: It will not be necessary to deal with complications such as metaphorical constructions or plays on words (the only famous military pun, General Napier's "*peccavi*" for "I have Sind", in fact comes from a *Punch* cartoon; the General never said it). Military training aims at instilling a common understanding of military language. Battlefield misunderstandings abound in history, but are I think more due to error in correctly matching the referents of speech acts than to misinterpreting the terms used. At the battle of Balaklava the commander's intent was expressed by the words "Lord Raglan wishes the cavalry to advance rapidly to the front – follow the enemy and try to prevent the enemy from carrying away the guns". The wrong guns were taken to be the subject of the message, with the well-known consequence that Cardigan's Light Brigade launched its charge into the "Valley of Death"; but there was no misunderstanding of terminology.

3.1.1 Assertive Speech Acts

Assertive speech acts serve to make an assertion that, in the speaker's belief, some proposition is true. Examples might be "18 platoon is at Bridge Farm", or "there are no enemy within 1000 meters".

Most military reports and returns, such as contact reports, situation reports (SITREPs) and location states (LOCSTATs) seem to me to fall clearly into this category. The achievement of adequate situational awareness (SA) must depend to a great extent on the fluency and accuracy with which military personnel make assertive speech acts: It is no good spotting an enemy patrol if you fail to report it. With the advent of the automatic position location, navigation and reporting (APLNR) system in Bowman (the British Army's new tactical radio system, which is just entering service at the time of writing) one may expect many such reports to be made automatically, and this may result in a reduction in voice traffic on command nets.

One may also view responses to challenges as assertive speech acts; when asked "who goes there?" the reply "friend" asserts one thing, and a burst of fire asserts the other. One might view the marker panels and other devices used to prevent fratricide as permanent assertive speech acts proclaiming "I am a friend".

3.1.2 Directive Speech Acts

These direct the interlocutor to do something. Examples might be "I want you to go to 18 platoon's location", or "Take rations for 72 hours."

This category clearly includes those cases where a superior gives an order or assigns a mission to an inferior in the chain of command. Elaborate orders would be a series of such speech acts. Some control measures (things like routes, phase lines or nominated areas of interest) might be viewed as persistent expressions of a commander's speech act. A boundary line proclaims "Do not cross this line", a free-fire zone says "shoot anything in this area without challenge", a named area of interest (NAI) says "pay attention this way".

I also take this class of speech acts to include requests from an inferior to a superior, as for example a helicopter request (HELQUEST) or a request for casualty evacuation (CASEVAC). This would also cover the case where the command relationships in force do not give the superior the right to issue a direct command.

3.1.3 Commissive Speech Acts

These speech acts commit the speaker to some future action; they make a promise. Examples might be "I will get a resupply to you before last light" or "I will give you an updated situation report at 18:00Z".

It is clear that such promises are necessary for collaborative planning to occur. The author's own observations (Salt 2001) of HQs at work at the British Army's Command And Staff Trainers (CASTs) and the work of Widdowson and Miller (Widdowson and Miller 2003) suggest that collaborative approaches to command are quite common, and

much more so than would be suggested by a simple-minded view of C2 that sees orders flowing down and reports flowing up the chain of command.

3.1.4 Expressive Speech Acts

These express the psychological state of the speaker. Examples might be "I am sorry to hear of 18 platoon's casualties", or "I am determined to carry on with this operation".

At first sight these seem to be the least interesting class of speech acts from a military perspective, and it is hard to think of a class of military message that is supposed to include expressions of psychological state. However, British Army commanders set a great deal of store on the "moral component" of combat power, and ensuring the psychological welfare and fighting morale of their soldiers is a key task for officers and NCOs. Officers in the British Army show an extremely strong preference for giving their orders face-to-face. Not only is it felt to be poor form to tell a man by e-mail to do something that might get him killed, but leaders prefer to be able to impress their personality directly on those they are leading, and to check that they have understood their orders by looking them in the eye. It is hard to see how such elements might be introduced into a simulation model, but efforts have already been made in other fields to create agents with emotional state, and there is evidence that affective (emotional) control may have superior survival value to deliberative (planned) control in some circumstances (Scheutz and Logan 2001).

3.1.5 Declarative Speech Acts

These speech acts declare something to be so. They may be used to assign a name or role. Examples might be "Your platoon is the company main effort", or "The password for tonight will be 'Pomegranate'". The point here is that the making of the utterance (if the speech act is successful) in itself accomplishes its meaning.

Just as with directive speech acts, in a military context the success of declarative speech acts will presumably depend on the formal authority of the speaker. Commanders will only be able to nominate elements under their command as being the main effort.

4 THE POTENTIAL USES OF SPEECH ACTS IN MILITARY SIMULATIONS

4.1 Command and Control of Friendly Forces

The potential usefulness of speech acts to convey command intent to friends and share information within them is, I hope, fairly obvious. This command need not be based on a strict command hierarchy, but could include collaborative approaches, which we might expect to see more of in the future if NEC delivers on its promise of "self-synchronisation" of forces. Assertive speech acts are used to share situation awareness information; directive speech acts, to give orders or make requests; commissive speech acts, to enter into contractual agreements for future performance; and declarative speech acts, to designate people or units to certain roles, to define command relationships or to assign names to things such as control measures.

The approach of concentrating on speech acts as the organizing principle of the simulation of command would, I hope, be easier to make credible and acceptable to military users than one based primarily on the internals of agent architecture. The problem with any cognitive agent architecture is that it is hard to answer the question "why this architecture, and not some other?", for it is impossible to look inside real people's heads and make any meaningful comparison with an agent architecture. The speech acts used in a command simulation model, on the other hand, can be compared with the speech acts performed by real people, which are much more exposed to view.

4.2 "Low-Intensity" Conflicts

Perhaps less obvious is the applicability of speech acts to negotiations in coalition and counter-revolutionary warfare. Friends may be more or less co-operative, enemies may be induced to defect, and neutrals may be persuaded either way – the membership of red, blue and white forces is not hard-coded. The Chieu Hoi and "Kit Carson" scout programmes in Viet Nam, the "counter-gangs" in the Mau-Mau insurgency, and the firqats in the Oman campaign all furnish historical examples of counter-revolutionary forces raised from surrendered enemy personnel to operate against their former comrades-in-arms. To win in counter-insurgency operations, one must have a better story than the other side. On 12th April, 1974, during the campaign in Oman, Captain Simon Garthwaite, Special Air Service Regiment, was killed while trying to rescue one of his firqats under fire. The impact of such an act on the loyalty of other firqats should be obvious, and it can be viewed as a commissive speech act, saying something like "we will stick with you, no matter what happens". As one of the planners of SAS operations in Oman said, "It was not our numbers, but our ideas which made a big difference" (Geraghty 1980). In the same vein, the counter-insurgency expert Frank Kitson has said "it is in men's minds that wars of subversion have to be fought and decided" (Kitson 1971). I suggest that speech acts are the principal weapons in this war of ideas, and if we cannot model them, then we can hardly claim to model counter-insurgency war.

4.3 Deception

Less obvious still, I suggest that deception can be viewed as a series of speech acts for whom the intended audience is the enemy. Evidently the speech acts in this case are mendacious; a dummy minefield might be thought of as making the assertive speech act "I am a real minefield".

Camouflage and security measures might be thought of as attempts to stifle assertive speech acts that would otherwise be committed, such as "There is a platoon of tanks on this hill". In really elaborate deception plans, the enemy might be permitted access to friendly communications or plans which have deliberately been "planted" in order to mislead; these can be seen as mendacious commissive speech acts.

4.4 Non-Lethal Weapons Effects

Least obvious of all, perhaps, is the fact that some of the effects desired in effects-based planning can be seen as messages to the enemy. A War Office report from 1943 available at the PRO, Kew (WO 32/10575) describes some practical experiments performed during WWII on four groups of 25 volunteers to find what effect the noise from explosions had on their efficiency in conducting various tasks. Waxing unusually poetical for an operations researcher, the unnamed author of this report stated: "Loss of efficiency in the form of nervous distress during bombardment is due to the direct association of the noise with the conviction that the means of production of that noise is lethal. The noise must be death's song. In these experiments all fear of death or injury was carefully eliminated beforehand." In other words, the suppressive effect of weapons depends not only on the intimidatory effect of their sound, but also on the implicit message "I will kill you", which may be interpreted as a commissive speech act. In this sense, the cannon really is *ultima ratio regis*, the last argument of kings.

5 WHAT NEXT?

The next step will be to attempt the implementation of such a system for inclusion in the synthetic environment being developed for DIF DTC project 11.1. The initial stage will be to implement an interpreter capable of recognizing a range of speech acts; since military communication is quite formal and stylised, this is a considerably more modest undertaking than dealing with natural language. A carefully-chosen subset of effect verbs taken from APP-6a, the current guide to military symbols, will provide a basis for the military vocabulary that will need to be recognized. Some spatial and temporal modifiers (for example "West of" or "no later than") will also need to be included in the language. Once the interpreter is written, the language will be used to manipulate the internal information state of agents in the synthetic environment in a manner analogous to the way a multi-user dungeon (MUD) player uses the game's command language to manipulate the information state of the MUD environment.

The ultimate aim will be for agents in the synthetic environment to be able to express their own beliefs and intentions in well-formed speech acts which are understandable to human users as well as other agents.

6 CONCLUSION

I have tried to show that an approach to simulating military command and control systems based on Searle's theory of speech acts might prove fruitful, and might conceivably be extended to cover a variety of other concerns that have not been well represented in traditional simulation approaches. I have also indicated the general lines on which our efforts in this direction will proceed.

REFERENCES

Alberts, D.S., J.J. Gartska, F.P. Stein, 1999. *Network Centric Warfare*, DoD CCRP, Department of Defense, Washington.

Austin, J.L., 1962. *How to do Things with Words*, OUP, London.

Cross, M., D. Bopping, 1998. Collaborative Planning Processes in Command and Control, *Fourth International Symposium in Command and Control Research and Technology*, September 14-16, Nasby Slott, Sweden, DoD CCRP.

Fitz-Gibbon, S., 1995. *Not mentioned in Despatches*, Lutterworth Press, London.

Geraghty, T., 1980. *Who Dares Wins*, A&AP, London.

Kitson, F., 1971. *Low Intensity Operations*, Faber & Faber, London.

Ministry of Defence NEC home page, 2004, available online via <http://www.mod.uk/issues/nec/> [accessed April 02, 2004].

Park, A., 2002. OneSAF: An Upgrade to Realism, in: *Military training & simulation news*, **4**:6, November 2002.

Robinson, S., 2001. Modes of Simulation Practice in Business and the Military, *Proceedings of the 2001 Winter Simulation Conference,* ed. B.A. Peters, J. S. Smith, D. J. Medeiros, M. W. Rohrer, Arlington, VA, 9th-12th December, pp. 805 – 811.

Salt, J.D., 2001. Radio traffic on Brigade and BG command nets: Observations from CAST, QinetiQ Fort Halstead.

Scheutz, M., B. Logan, 2001. Affective vs. Deliberative Agent Control, in: *Proceedings of the AISB '01 Symposium on Emotion, Cognition and Affective Computing*, University of York, 21st-24th March, pp. 1– 10.

Searle, J.R., 1969. *Speech Acts: An Essay in the Philosophy of Language*, CUP, Cambridge.

Simpkin, R.E., 1985. *Race to the Swift*: *Thoughts on Twenty-first Century Warfare*, Brassey's, London.

Smith, B., 1990. Towards a history of Speech Act Theory, *Speech Acts, Meanings and Intention: Critical Approaches to the Philosophy of John R. Searle*, ed. Burkhardt A., de Gruyter, Berlin, available online via <http://ontology.buffalo.edu/smith/articles/speechact.html> [accessed April 02, 2004].

Widdowson, J.M., R.J.R. Miller, 2003. Communicating Intent: Coerce, Contract, Cooperate, in: *British Army Review* number 130.

WO 32/10575, Experiments Concerning Indirect Effects of Explosions on Human Beings, 1943, available from the Public Records Office, Kew.

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