Rules and Regulations in Maritime Collision Avoidance: New Directions for Bridge Team Training

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1. INTRODUCTION. Ever since the International Regulations for Prevention of Collision at Sea (IRPCS) were introduced as a control system for collision avoidance, there have been disputes and arguments about exactly what they mean, and how they should have been applied in particular collision incidents.[1] The principle of deciding by international agreement which ships should be given the duty of keeping clear of other ships generally works well but, as traffic volumes increase, so do situations in which the IRPCS alone do not provide a clear indication of what is expected of the mariner. Various solutions have been addressed to this problem, ranging from proposed radical revisions of the whole principle of collision avoidance,[2,3] through periodic thoughtful adjustments to the details of the IRPCS, to informal additions and requirements imposed by individual shipowners on their fleets. The residual problem with any solution (except perhaps the first mentioned) is that there will always be exceptions where the rules are unclear or ambiguous. Adding adjustments may reduce these exceptions but, unless all uncertainties can be removed, the adjustments may create a new and even more complex set of exceptions, which are yet more difficult to interpret.

From the mariner's point of view, there are two extreme types of collision avoidance control system: one which is very simple and universal in principle, but which requires considerable judgement and experience to use safely; the other a complex compendium of instructions for dealing with every conceivable encounter, leaving nothing to be decided at the time. Although there is no reason in principle why either of these two extremes of system type should be better than the other, there is a general tendency in corporatist structures such as exist in the maritime world to gravitate towards the bureaucratic, and favour the second of them. Unfortunately, it seems likely that the process of chasing exceptions by system modification may never converge,[4,5] in which case there is a real chance of ultimate chaos.

Whatever the bias in the collision avoidance system towards either extreme, mariners will always need two types of expertise in collision avoidance: a ready recall of the textual details of the whole system, and an experienced eye for how

the individual components should be interpreted in choosing what to do; the two extreme types merely require a different mix of these two skills. From a managerial point of view, the 'bureaucratic' model has the advantage that training and assessment of mariners is more a matter of concrete and testable knowledge than it is of perception and judgement, which are much harder to measure. Nevertheless, these latter qualities will continue to be the basis of good, safe watchkeeping practice, so long as human watchkeepers continue to exist; so, therefore, will the problems of how competence at collision avoidance is to be described, assessed, and improved.

2. THE NATURE OF RULES. Using some ideas from the philosophy of mind[6,7] which depict man as an 'intelligent rule-following animal', it is possible to look in more detail at what exactly is meant by a 'rule'. In the present context it is interesting to compare it with the idea of a 'regulation', since the IRPCS are known interchangeably as the '*Rules* of the Road' and the 'Collision *Regulations*'. The two concepts are in fact quite different from each other. A regulation prescribes exactly what is required (or permitted, correct, legal, etc.), and what is prohibited (or incorrect, illegal, etc.). A rule describes what is generally considered to be proper (or expected, accepted, justifiable, etc.) as opposed to what is improper (unusual, ill-advised, careless, etc.). The key difference is that regulations refer to the external control of people's behaviour, regardless of what they themselves might want to do, whereas rules refer to people's actions – what they intentionally do, and what they expect of each other. In this sense, rules are a kind of implicit social contract or agreement, rather than externally-imposed limitations on behaviour.

Although in modern life regulations play a large part in the control of society and its systems, maritime collision avoidance is an apparently unique example of an industrial control system mainly governed by rules. Possibly, the main reason for the evolution of a rule-governed system (as opposed to a regulated one) is the tradition that each ship's master is independently in control of his ship. When in collision avoidance the system expands to include more than one ship, no one person is in overall control, and only a rule-based approach enables each watchkeeper to understand and predict the actions of the other.[8]

3. REGULATIONS AND RULES WITHIN THE IRPCS. As a reflection of the two model characteristics of control-systems described above, it is not surprising to find that the IRPCS contain a mixture of rules and regulations (each term from henceforth in this paper will be used distinctively). The most important discriminator between regulations and rules is that regulations contain all of their meaning within their text, whereas rules depend for their meaning on a knowledge of the system to which they refer and so cannot be understood by reference to their text alone.

As a typical example of a regulation, 'Rule' 28 prescribes in a very simple way the lights and shapes to be shown by a vessel constrained by her draft. There is no need for knowledge about what such ships usually do: it is correct for them to show a black cylinder by day, and it would be incorrect to show two red lights at night instead of three. This can be fully understood and complied with by anyone who knows the meaning of the words, and has never been to sea.

The true rules are those like Rule 16: 'Every vessel which is directed to keep out of the way of another vessel shall *so far as possible* take *early and substantial* action to keep *well clear* (italics added). Although the principle of this rule is simple and easy to understand, the phrases in italics are not precisely defined, and have an 'unwritten' meaning beyond the words themselves. Phrases such as '*so far as the circumstances of the case admit*', '*the ordinary practices of seamen*', and '*a safe speed*' abound in Parts A and B (1–19) of the IRPCS, and identify true rules; the remaining items (20–38), and the Annexes, do not contain many such phrases, and are mostly regulations.

The essential point about rules is that they are socially defined. The meaning of '*a safe speed*' is a mutual agreement between parties concerned, taking into account the prevailing circumstances. If parties disagree, the meaning of the phrase is lost until agreement is found. The parties may be two ships, a ship and a harbour authority, a fleet, a jurisdiction, or the entire maritime community: the principle is the same. The inconvenience of this from the bureaucratic point of view is balanced by the great flexibility and simplicity which mutual agreements allow. Much of human life is based on implicit rule-following: it seems to be natural to us as a species.

Rule-governed systems become infused with regulations in various ways. Some individual agreements which become widespread enough to gain the status of rules may naturally go on to become 'absolute', in the sense that no reasonable exceptions to them can be found. They thus lose their rule-like qualities of imprecision and adaptability, and effectively become regulations. A more insidious but very common form of regulation arises from needs perceived by administrations to limit the powers of parties concerned in agreements. This may be in pursuit of wider harmony and uniformity, or an acknowledgement that there are parties in existence who cannot be trusted to operate within a rule-governed system, or simply a desire to control behaviour in what seems like an orderly and responsible way. Whatever the motive, the encroachment of regulations into a rule-governed system adds a fundamentally different element to the control system, and does not necessarily improve or simplify it.

4. LEARNING TO OBEY THE RULES. Clearly, trainee mariners need to know the details of the IRPCS in order to obey them consistently, and learning them (in one sense) can be achieved in classroom settings. Both of the Rules mentioned above (28 and 16) can easily be remembered parrot-fashion. This is all that is needed for a lights-and-shapes regulation like Rule 28; however, parrot-learning the 'true Rule' 16 merely teaches a fairly obvious principle of collision avoidance, and is of little or no help in distinguishing proper from improper practice.

It seems logical and sensible to begin courses of navigational instruction with an element of classroom-style 'rule-knowledge', as a theoretical precursor to more practical training to come. It has the advantage of being easy to teach and easy to examine by means of simple recall or recognition testing. However, once it is seen that this is really 'regulation-knowledge' and not true rule-knowledge at all, it becomes clear why such knowledge is insufficient as a measure of proficiency in avoiding collisions.

Learning to apply rules must always be a matter of observing what people actually do in practice, and what they expect of each other. The 'people' are the group or culture in which the rules are being applied. Ultimately, it is that group or culture which decides how the rules are interpreted. The very existence of a rule, as a form of social contract, embodies the idea of a society, or 'reference group' within which the agreement exists. Trainee watchkeepers learn how to apply the Steering and Sailing Rules by observing the behaviour of the group to which they belong: the Master of their ship, and other watchkeepers, both on their own ship and on other ships they encounter.

Since the same rule may serve different groups and cultures, which may differ in their views of what is and is not acceptable, it is important to realise that *the same rules may mean different things to different people*. While trainee mariners are still qualifying, they feel that they have to adopt the culture and expectations of the reference group whose approval they are seeking: instructors, examiners, and potential employers. These people, for reasons of their own, usually adopt interpretations of the IRPCS calculated to place them above reproach: no CPA (closest point of approach) ever to be less than two miles, sound signals on every manoeuvre, etc. In order to demonstrate a 'correct' grasp of the Rules, candidates must be careful to go along with this, or risk failure. When they rejoin the culture at sea, where the Rules are the same but the application is based more on practicality and custom than on lofty example, they quickly adapt their interpretation to what they find there. Unfortunately, the mismatch between what trainees are 'taught' and what they 'learn' often makes them very sceptical of training and qualification procedures of any sort.

5. TOWARDS A TRAINING STRATEGY FOR COLLISION AVOIDANCE. The uniquely rule-governed nature of the collision avoidance control system may call for specialised training and assessment strategies different from those found in other aspects of professional development. It is worth considering what these strategies might be.

Collision avoidance proficiency undoubtedly has elements of knowledge and skill – for example, regulatory and procedural knowledge, understanding ship-handling characteristics, use of ARPAs – which can be successfully taught, learned, and assessed in conventional ways. However, attempts to train and test rule interpretation by the same means will only result in trainees adapting their responses to the norms of the instructor group, and will generally be unreliable as a measure of unsupervised task performance. An additional and different strategy may be required.

Since individuals always learn the practicalities of rule compliance from the group in which they belong, improvements in rule compliance will only be achieved by influencing the group norms rather than the individual. The ideal, perhaps, would be that everyone concerned (instructors, officers, fleet managers) shares exactly the same culture with regard to rule interpretation; that is, belongs to the same 'reference group', but it would be no easy task to achieve this. Steps in the right direction, however, are to gain awareness of the differences that already exist, and to avoid tactics that result in widening them. Over-regulation is one such tactic, usually resulting in the growth of hidden informal rule-systems

which take the place of the desired norm; another is the 'examiner-culture' already mentioned, which creates a climate of disbelief. There may well be other cultural differences between nationalities, coastal *versus* deep-sea, etc. which have a bearing on collision avoidance practices, and these should be carefully studied.

Watchkeeping is mostly a solitary occupation, and it would not be surprising to find that those who enter the profession tend to have personality traits that value independence, responsibility, and carefulness. Many experienced watch-keepers have worked out their own set of rule interpretations, carefully and responsibly, but are not accustomed to comparing notes with others, either senior or junior to them. It is natural for some officers to be quite defensive (even secretive) about their watchkeeping practices, perhaps because of the 'fear culture' that often surrounds their responsible and very occasionally dangerous job. These factors strongly inhibit the kind of group learning necessary to improve collision avoidance practice.

No effective group learning can take place in the absence of some level of trust. Trust in work organisations is generally related to the power that some people have over others below them in the hierarchy, and is not an easy commodity to manipulate, since its roots often lie deep within the psychological character of the organisation. However, the maritime industry has a unique built-in basis of trust, since an ocean-going ship is the only industrial setting in which a senior operational manager actually sleeps on the job, relinquishing control but not responsibility. The kind of trust that is necessary to promote good collision-avoidance rule compliance is part of what is these days regarded as good management style, based on openness, honesty, constructive rather than destructive criticism, etc. The important thing to emphasise is its crucial importance to rule-governed collision avoidance, and in particular to how officers learn what is expected of them. Whatever the reluctance of a fleet management to change from a familiar, hierarchical structure to something of a more 'Theory-Y' kind,[9] it could well be worth it for the sake of reduced collision risk alone.

6. ASSESSMENT OF RULE COMPLIANCE. There is nothing new in observing that assessing collision avoidance competence is a very difficult problem. As already discussed, traditional 'driving-test' procedures, whether in real life or in simulators, may produce little more than the stereotyped responses which seem to be demanded in those circumstances. While there is no ready solution to this problem, and no likely end to the need for individual competence assessments, it is worth considering how the view of collision avoidance as a group function might impact on its assessment. The most desirable situation, from a safety point of view, is an organisational climate which fosters rapid and effective learning of collision avoidance skills in all watchkeeping personnel. This would seem to imply assessment of whole bridge teams on their success in maintaining a suitable organisational climate. Once the technical competence of individual officers is assured, their performance will be a function of how willing they are as a group to discuss practices and incidents with each other, to demonstrate understanding of their own actions, admit their own mistakes, and

tolerate their colleagues' differences of opinion. The level of trust achieved by the management style of the Master will be a key element in obtaining good results, against the background of which it should be possible to assess the contribution of individual officers and take remedial measures where necessary.

7. COLLISION AVOIDANCE, SAFETY, AND QUALITY. One of the problems with collision avoidance at sea is that it is really too easy. The most inept, careless, or dangerous manoeuvres often succeed in averting disaster, and errors once made can often be corrected in plenty of time. Unless an actual collision occurs, there is no cost to the ships involved, other than perhaps a little swearing on the bridge. The task is quite different from most professional roles, where wise and careful actions result in measurable good performance, and where errors and omissions have all too visible consequences. The bridge watchkeeper has no regular source of feedback about safe behaviour, other than a vague fear that one day something might go seriously wrong, and the very occasional feeling that given a bit of bad luck it might have done. Safety, in the sense of immunity from collision, therefore hangs by the most tenuous of threads from even the most responsible and well-trained bridge teams. This is clearly unsatisfactory from a global point of view, and the ideas discussed here are aimed broadly at improving the quality of safety in maritime fleets. In another sense, the quality of working life of deck officers will be improved if fear and uncertainty can be replaced by trust and feelings of confidence in their own and their team-mates' abilities, and here too it seems that something worthwhile might be achieved.

REFERENCES

[1] Plant, G. (1996). The collision avoidance regulations as a regulator of international navigation rights: underlying principles and their adequacy for the twenty-first century. This *Journal*, **49**, 377–393.

[2] Syms, R. J. (1994). Rules for the 21st century. *Seaways*, September and October.

[3] Thomas, D. (1994). Dual action v. the Rules. *Seaways*, November.

[4] Perkins, C. J. and Redfern, A. (1996). Requirements for coordination and the application of an automatic collision avoidance system. This *Journal*, **49**, 129–135.

[5] Cockroft, N. (1994). Colregs – case against major change. *Seaways*, December.

[6] Peters, R. S. (1958). *The Concept of Motivation*. Routledge and Kegan Paul, London.

[7] Hargreaves, D. H. (1980). Common-sense models of action. In *Models of Man* (A. J. Chapman and D. M. Jones, eds.) British Psychological Society, Leicester.

[8] Perrow, C. (1984). *Normal Accidents*. Basic Books, New York.

[9] McGregor, D. (1959). *The Human Side of Enterprise*. McGraw-Hill, New York.

KEY WORDS

1. Collision Avoidance.   2. Bridge Team Training.