“Loss of situation awareness” by medical staff: Reflecting on the moral and legal status of a psychological concept

Hugh Breakey, Roel D van Winsen and Sidney W A Dekker

This article examines the emergence of “accurate situation awareness (SA)” as a legal and moral standard for judging professional negligence in medicine. It argues that SA constitutes a status, an outcome resulting from the confluence of a wide array of factors, some originating inside and others outside the agent. SA does not connote an action, a practice, a role, a task, a virtue, or a disposition – the familiar objects of moral and legal appraisal. The argument contends that invoking SA becomes problematic when its use broadens to include professional or legally appraisable norms for behaviour, which expect a certain state of awareness from practitioners.

INTRODUCTION

“Accurate situation awareness (SA) of medical staff is integral for providing optimal performance during the treatment of patients.”¹ Thus proposes an article in a recent issue of an anesthesiology journal. In this article, we consider the emergence of “accurate SA” as a legal and moral standard for judging professional negligence. SA, though there are a number of characterisations, refers broadly to a practitioner’s knowledge and understanding of a situation and its evolution, informed by their perception and attention. In other words, “accurate SA” means the agent holds correct beliefs about the relevant elements of the situation, while “mistaken SA” or “poor SA” connotes the agent holds false or incomplete beliefs about those elements. We take the notion of “false belief” in the strict positivist manner of most SA research and use of SA in investigation reports, meaning that a person’s internal belief, their representation of the world, does not correspond to the external material world.²

We contend that SA should play no role assigning blame or, more specifically, in determinations of whether a professional has breached their duty of care. In ordinary understandings of the duty of care, whether or not there is a breach of the duty depends on several factors, such as foreseeability of harm, magnitude of the risk, the practicality of the precautions taken, and of reasonableness.³ Ultimately, the question focuses on whether a hypothetical reasonable person would have acted in a similar manner under the same circumstances. “The test is not whether the defendant acted reasonably, but whether a reasonable person placed in the position of the defendant would have acted as the defendant did.”⁴ Our question in this article is whether SA should be injected into appraisals of a breach of duty of care. In other words, we question whether appeals to “accurate SA”, “poor SA” or “mistaken SA” should play a role in determining moral and legal blameworthiness.

Accident inquiries outside of medicine have long used SA in their causal reasoning, connecting deficient or inaccurate or lost SA with a bad outcome. The investigation into a Brazilian mid-air

¹ Hugh Breakey, BA(Hons), BA(Hons)(Phil), GDip(Phil), PhD(Phil), Key Centre for Ethics, Law, Justice and Governance, Griffith University; Roel D van Winsen, MSc (CogPsych), MSc (HumanFact), School of Humanities, Griffith University; Sidney W A Dekker, MA (Psych), MSc (Psych), PhD (Eng), Safety Science Innovation Lab, Griffith University.

Correspondence to: h.breakey@griffith.edu.au.


collision, for instance, concluded that: “[The pilots] did not monitor the functioning of the transponder, and maintained a poor situational awareness, well below the recommended standards.”

In the usual course of affairs, professionals are judged according to the standards of their particular profession. A pilot, air traffic controller, doctor, engineer, or social worker must thus be judged for their reasonableness, respectively, through the eyes of the reasonable pilot, air traffic controller, doctor, engineer, or social worker. This principle has become known as the Bolam test:

Where you get a situation which involves the use of some special skill or competence, then the test as to whether there has been negligence or not is not the test of the man on the top of a Clapham omnibus, because he has not got this special skill. The test is the standard of the ordinary skilled man exercising and professing to have that special skill. A man need not possess the highest expert skill; it is well established by law that it is sufficient if he exercises the ordinary skill of an ordinary competent man exercising that particular art.

The Bolam test says that a professional is not required to have an extraordinary degree of expertise or knowledge, but a degree of competence common to that of the “ordinary skilled man” in that profession.

In both accident inquiries and legal prosecutions, SA has been employed as one element of this professional competence. The coroner who investigated a friendly fire incident which killed three British soldiers in Afghanistan in 2007, rendered the verdict that the crew of an American fighter jet had lost “situational awareness” and were looking at the wrong village when they dropped the bomb.

In a case in Canada, a maritime officer was criminally convicted for his role in a ferry accident that killed two passengers. The argument for his dereliction turned on the ordinary skilled standard – that of the reasonable maritime officer – which was held to dictate that, “[m]aintaining situational awareness at all times and in all circumstances is key to proper navigation”. An “ordinary skilled” doctor, by comparison, could be required to have accurate SA, on the basis that it is “integral for providing optimal performance”. In order to avoid liability for negligence, doctors would therefore have to be able to show or argue that they had “accurate SA”.

In hindsight it is always easy to blame a “loss of situation awareness”. As Moray and Inagaki warned in 2000 (in a quote where “investigators” might easily be replaced by “judges”):

“situation awareness” … is poorly specified. What is the situation of which the operator is required to be aware? In most of the experimental or field studies, it is not well defined or specific. Rather, and for obvious reasons, it is almost as though the investigators want the operator to be aware of “anything in the environment which might be of importance if it should change unexpectedly”. This is, of course, not the phrase used in research. However, clearly, it is at the back of investigators’ minds. The pilot of an aircraft needs a keen situation awareness because if anything abnormal occurs he or she must notice it and respond appropriately. However, there are, logically, an infinite number of events which may occur. Perhaps one, therefore, expects the operator to be aware of the status of just those variables which, if ever they change, represent significant events. But, what are those? If one does not define exactly what the set of events is that the operator must monitor, how can he or she devise an optimal or eutactic monitoring strategy? It is logically quite unreasonable to ask merely for “situation awareness” as such, since if the set of events of which operators are to be aware is not defined, it is unreasonable to expect them to monitor the members of an undefined set; whilst if one defines a set, there is always the possibility that the dangerous event is not a member of the set, in which case the operators should not have been monitoring it.
This amorphous quality implies that SA may prove an inappropriate concept for considering moral blame or legal culpability or responsibility. Moray and Inagaki’s concerns, however, hint at a deeper problem again – and one that takes our focus here. SA in its canonical formulations and usual employment amounts to having a correct set of beliefs (about the relevant facts). As such, SA constitutes a status, an outcome resulting from the confluence of a wide array of factors, some originating inside and others outside the agent. SA does not connote an action, a practice, a role, a task, a virtue, or a disposition – all things that are the familiar object of moral appraisals.

**SA and Ethical Theory**

To examine this more closely, we turn to contemporary ethical theory and what it says about moral responsibility for holding a status, as distinct from performing an act or pursuing a goal. Following an orthodox categorisation, we can divide ethical theories into three types: virtue theory; deontology; and consequentialism. Harkening back to Aristotle, virtue theory focuses on people’s character traits, asking whether they act courageously, wisely and benevolently. Virtue theories go on to provide guidance to people showing what acts they can perform to nurture the appropriate emotional dispositions, and so become virtuous. Deontology takes a different approach, focusing on specific types of actions – such as murder, theft, and lying (for example, the “Ten Commandments”). Deontology prohibits these types of acts, and prohibits them irrespective of what effects they have on the person’s character or on the world. The act itself, and not the virtue driving it, or the results of it, becomes the object of moral appraisal. As we can see, neither of these theories holds a person responsible for a status or an outcome. But what of consequentialism, the ethical theory that judges act in terms of the amount of good they create (such as utilitarianism, which enjoins moral agents to create the maximum sum of happiness in the world)? Despite its name, consequentialism does not hold agents responsible for the outcomes of their actions. Consequentialist ethics demands agents maximise expected overall utility; that is, they are enjoined to perform the act that, from their local perspective, probabilistically offers the greatest overall benefit in utility to the world.\(^\text{12}\)

But why do these ethical theories, even those using consequences as the central organising concept, resist assigning moral culpability to outcomes, statuses and achievements, and instead apply culpability to actions, decisions and virtues? We can find the answer in the well-known principle “ought implies can”, which states, broadly speaking, that to be bound by a duty requires the possibility that one can knowingly perform that duty. Many theorists trace the principle to Immanuel Kant, but there is little need to invoke philosophical authorities when anyone can grasp the reasoning behind the idea. “Ought implies can” makes straightforward sense from both a retrospective and a prospective perspective. Retrospectively, it is morally confused (and alarming) to hold someone culpable for something that they could not have foreseeably prevented. If they could not have foreseeably prevented it, then they were not by their choice responsible for it; if they were not responsible for it, then they cannot to be blame for it. To blame someone for something they could not have done amounts to scapegoating them. Prospectively, it makes no sense to put forward a standard of conduct to which people can, despite all the best intentions and indeed despite performing the morally correct actions (given their local rationality, that is, their goals, knowledge, and constraints at the time of their act or decision) at every point, nevertheless fail to achieve.

**The Legal Status of (Loss of) SA**

In order for criminal liability to apply, a person needs to perform negligent acts – that is, acts that a reasonable person, or ordinary professional actor, would not have performed. Recall the general definition of criminal negligence as doing something, or omitting to do something that one’s legal duty to do, showing wanton disregard for the lives and safety of others.\(^\text{13}\) The law here refers to actions and intentions, not statuses. In law, outcomes are not subject for (deontological) blame. We

---


\(^{13}\) Michaelides-Mateou and Mateou, n 4.
hold people responsible for performing or failing to perform acts because one can choose whether or not to perform acts, but cannot will into existence a particular status or outcome (such as accurate SA).

While we should therefore (as a matter of general principle) resist holding people responsible for having a particular status, our resistance can only increase when the particular status in question amounts to holding a false belief. Holding a false belief, like having incorrect or poor SA, has the additional difficulty that one usually does not (and sometimes could not possibly) know that one is in error. In her seminal paper on the topic, Mica Endsley was clear that SA comprised a “state of knowledge”14 – as opposed to the process of “situation assessment” – and well aware that one could lose SA without even knowing one had lost it:

A real issue concerns how people know when their SA is in error. Very often they may be completely unaware of how much they do not know or of the inaccuracy of their internal representation of the situation.15

The ease with which terms like “error” and “mistake” can be applied to SA exacerbates the potential for wrongfully attributing blame. Consider three different ways we can use terms like “error” and “mistake” in cases relating to the possession of a false belief (all three usages can be observed in most publications on SA).16 First, a person might form their beliefs sloppily, or never search for evidence supporting or disproving those beliefs. In these cases, we might say they committed an error of evidence-gathering, logic, rationality, or reasoning. For example, someone might form their beliefs on the basis of the well-known gambler’s fallacy: “I concluded that the coin would fall heads this time on the basis of it falling tails the preceding five tosses.” Secondly, when someone holds a false belief, we can express that as a “mistaken” or “erroneous” belief. “I thought my football team was going to win the premiership, but it turns out I was mistaken.” Thirdly, when someone acts or makes a decision on the basis of a false belief, we might say that the act or decision was mistaken or in error. “I mistakenly locked my car door, because I believed I’d already taken the keys from the ignition and put them in my bag.” We can thus use the language of “mistake” and “error” to apply to: actions-of-belief-formation; beliefs themselves; and actions-taken-on-the-basis-of-false-beliefs.

A person can make errors of reasoning and still come (through good fortune) to a correct belief. The coin-tosser in the foregoing example falls victim to the gambler’s fallacy in thinking the coin toss is bound to come down heads, but they actually still have a decent chance (an even chance) of holding a true belief about the outcome of the toss. The converse holds true as well; a person can form beliefs in a wholly rational and epistemologically responsible manner, and still come to a false belief. Examples abound: if a cockpit malfunction gives a pilot an inaccurate reading on the altimeter, the pilot might make an entirely justified estimation of the aeroplane’s altitude that departs from its real altitude. In philosophical terms, the pilot held a rational belief, notwithstanding that that belief turned out to be incorrect.

As a result, we need to be very careful in employing terms such as “error” or “mistake” in application to beliefs, or to plans made on the basis of beliefs. One can come to false beliefs without actually committing any sort of error of rationality or belief formation. One can also make decisions to act on the basis of false beliefs without committing any sort of error of rationality or means-end calculation. As a result, and as a trick of language, one can hold a “mistaken” belief and engage in a “mistaken” plan of action without actually ever making a mistake in the ordinary sense – that is, without ever doing anything that one should (rationally) not have done. The sense of mistake that involves doing something one should not have done applies only to the first sense of mistake: a breach of rational or evidence-gathering norms during the process of belief acquisition. From our prior discussion of the principle of “ought implies can”, one can only be culpable for this type of mistake.

Applied to SA, one can be culpable for mistakes in reasoning, monitoring or evidence-gathering: errors of belief formation. However, when one fails to hold SA (or has poor SA) or one crafts

---

15 Endsley, n 14 at 57.
16 See, for example, Endsley, n 14.
mistaken plans on the basis of one’s perceived awareness of the situation – “mistaken” not because of any rational or strategic error, but simply because the original perception failed to represent the true state of the world – one cannot be held to blame. One can only be culpable for the first type of mistake, in failing to perform the acts that are known to reliably lead to accurate belief formation; acts that the “ordinary skilled professional” would have carried out in order to update their SA. These are the actions that the Bolam test dictates. Possessing a particular state of mind – accurate SA – is a normative requirement that does not fit this bill.

**Losing SA?**

With this in mind, we need to be particularly careful when we speak of failing to hold SA, losing SA or failing to maintain SA. The use of these active verbs can imply a person is performing an action, and is therefore doing something for which they can be held morally or legally responsible. To the contrary, however, a person can lose SA without acting at all, and even lose SA while assiduously carrying on appropriate monitoring tasks. Note, though, that in some cases a person knows they have lost SA and elects to do nothing about it, and continues to plan as if they had it. Here the loss certainly might be important to allocating blame, because we are speaking of something that they know has gone wrong, and of their failure to take appropriate actions given that fact.

Of course, one may be to blame for the reasons why one does not possess SA. But here the usefulness of SA recedes, replaced by a concern with the epistemic rationality of specific actions. By “epistemic rationality” we mean the properties of actions that lead the actor towards particular outcomes. An agent might be to blame because they failed to arrive at work sober, fell asleep, failed to look at a particular screen, did not double-check a particular piece of information, or neglected to collaborate with a colleague. As specific actions that an agent knows they have to perform, all of these acts are in principle proper subjects of blame. However, there is no need in making judgments about these failures to invoke suboptimal outcomes (statuses) such as poor, inaccurate, or lost SA. This is particularly the case, as in looking back at an adverse event it is always possible to argue that someone’s actions were not optimal; someone’s awareness of the situation was not “complete” or “accurate”. In hindsight, it is always possible to show that there was (what we now know to be a critical piece of) data available that the person in question did not observe. However, just as the ethical consequentalist does not hold people to blame for failing to achieve the very best outcome, but does hold them responsible if they fail to act in ways they knew would have probabilistically led to good outcomes, so too can an operator never be culpable for failing to maintain SA, but only for failing to perform “reasonable” actions – that is, the locally rational actions for a skilled professional in that situation.

We need to be wary, too, of using a lack of SA to cast about for unrealistic expectations about safety procedures. There may be good reasons in any particular case as to why people did, or neglected to do, what they did. With the benefit of hindsight, stating that a particular action or piece of information – which we now know to be crucial for a good outcome – was available to someone does not necessarily make them blameworthy for not acting or observing it in the moment. In order to deal with goal conflicts and resource constraints, working professionals routinely work around or loosely interpret many official safety procedures to perform their jobs properly and effectively – a phenomenon discussed widely in human factors as the gap between work-as-imagined and work-as-performed. This underlies why “work to rule” is an effective form of an industrial strike: namely, taking every single safety procedure in the rule book in its full and literal meaning often suffices to gridlock production. Using SA in hindsight tempts prosecutors to search for reasons why SA was lost, and it will often turn out that professionals avoided one or other regulation. Here hindsight bias, the lure of SA as a normative standard, and overly officious and pedantic safety guidelines conspire to form a perfect storm of mistaken culpability. In such cases, the test must always be what ordinary professionals actually do in such situations.
CONCLUSION

People can be held morally and legally responsible for their actions, their intentions, and their character. They are, however, not to be blamed for a certain status, especially a status like a false belief, which depends on an array of factors quite outside the agent’s sphere of control, and which inescapably implies the agent does not know they possess that status (people holding a false belief do not know it is false).

Nothing we have said here denies that SA may be a useful and legitimate concept in designing systems and thinking about preventing accidents in medical and other domains. We might well be able to improve system performance and safety by asking: “In this situation, what information must a person possess in order to perform optimally?” So too, it may even make sense in the wake of failure to retrospectively ask: “In this given case, is there any actor who, if only they had known what was unfolding (ie, if only they had possessed accurate SA), would have been able to prevent or mitigate this disaster?” Answering this question can be done without any claims that the lack of SA caused the accident in question, and (all the more) without any claims about how this particular person was not situationally aware in this case – for which there may be any number of valid reasons. While SA can therefore be a helpful concept in accident inquiries and investigations, even these contexts warrant some sensitivity in appealing to SA. Factual claims about “poor SA” or “mistaken SA” could be seized upon by prosecutors and the concept hijacked into a moral and legal discourse for which it is entirely unfit.

Ultimately, invoking SA becomes problematic when its discursive use broadens to include professional norms for behaviour, expecting a particular state of awareness from operators. When this normative requirement – to “maintain SA at all times” – is used to judge performance in questions of negligence and culpability, the object has exceeded both its appropriateness and usefulness. As such, we should purge SA from all moral and legal inquiries into blameworthiness.