The tip of the Totaltrack™ blade is protected by a silicone cover to minimize epiglottic or oropharyngeal injury. The Totaltrack™ does require a minimum inter-incisor distance of at least two cm and the device may be more difficult to insert in the presence of enlarged breasts.

In all our study patients, a full view of the glottis could be obtained and adequate ventilation established. Securing the airway, once one is expert, takes approximately 40 s. These findings suggest that the Totaltrack™ is a promising device for airway management and has the potential to become a preferred device in the emergency situation of a difficult direct laryngoscopy, when there is urgency to secure the airway with a cuffed tracheal tube. Further evaluation of its efficacy and safety is required.

## Memory and consciousness intertwined

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Editor—The review articles ‘Memory formation during anaesthesia: plausibility of a neurophysiologic basis’ and ‘Intraoperative awareness: controversies and non-controversies’, draw our attention to a fundamental problem in our profession.1, 2 Eger and Sonner define anaesthesia by the presence of only two components: immobility and amnesia.3 In fact the definition of anaesthesia has changed with time. The lack of an unambiguous definition confronts us with a difficulty to design studies that attempt to measure dose response relationships. For such studies a quantifiable parameter which exactly represents what we call ‘response’ must be available for measurement. Although we commonly use clinical signs, such as sweating, hypertension, tachycardia, lacrimation or anaesthetic depth monitors such as BIS, spectral entropy or MAC, they all are surrogate parameters. For instance, cortical electrical activity, recorded as electrical potentials, cannot be identified with consciousness or memory, unless, of course, we define this cortical electrical activity to be the scalar or vectorial parameter that represents consciousness or memory. This is a major issue in any physical investigation: the observable must be precisely defined in order to be able to unravel the mechanisms relating the measured parameter with it. Very often, after extensive research, involving sophisticated technology, one has to refine the definition of an observable. This is just how scientific research works.

Both the review articles1, 3 of the BJA present data from the literature showing that treat memory (recall) and consciousness (awareness) as two different and separable activities; this causes a problem if one wants to come to an exact definition of anaesthesia.

However, exploration of neurophysiologic research literature may provide us with a new insight in this field. Neurophysiologists have studied numerous cognitive functions of the brain in mammals (mostly rats). In almost all these studies a mathematician was involved. Indeed, in these studies the mathematics involved are complicated. One should have knowledge about mathematical groups, fields, topological manifolds, bundles, tensors, linear transformations, Lie groups, Lie algebras and other entities, which cannot be supposed to be known by most of us. Nevertheless, this research provides us with a mathematical model that allows us to understand cognitive functions in terms of linear mappings from sensory receptive fields to cortical areas, between different cortical areas and between cortical and subcortical areas.

Pellionisz and colleagues4 described how the brain continuously maintains a tensor representation of body position and muscle tone. Topological mapping (where the cortex is seen as a topological manifold) has been described for somatosensory, acoustic, visual and vestibular receptive fields.4, 5 Tononi and Balduzzi provide us with an information integration theory of consciousness. The authors integrate information, quantified by an entropy function applied to a priori- and a posteriori repertoires, which are sets of binary data that are permuted according to the laws of Boolean algebra, which itself can be seen as a linear transformation.6, 7 The human cortex has been described as a noncommutative Lie-group equipped with a sub-Riemannian metric (http://what-when-how.com/computer-vision-from-surfaces-to-3d-objects/noncommutative-field-theory-in-the-visual-cortex-computer-vision-part1/; http://what-when-how.com/computer-vision-from-surfaces-to-3d-objects/noncommutative-field-theory-in-the-visual-cortex-computer-vision-part2/). For the visual system, workers have described the functional geometry of the horizontal connectivity and a symplectic structure of the primary visual cortex, which can be seen as a contact bundle over the visual receptive field.8–11 If the manifold is curved, however, Fiori proves that manifold retraction is necessary.12 This retraction implicates the use of Lie algebras instead of Lie groups if the metric has to be preserved by the mappings. The fact that mammals have a cortical representation of a metric is well demonstrated by Moser and colleagues.5

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## Declaration of interest

None declared.

## Reference


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If the cognitive functions of the brain can be modelled by considering the brain to be a topological manifold with a bundle structure with horizontal connection, then one can define consciousness as the infinitesimally short activity (Lie algebra) and memory as the time-integrated activity (Lie group) of them. This means that what we call ‘conscioussness’ and ‘memory’ are in fact two intertwingled manifestations of just one single central nervous system activity: the memory-consciousness forming activity, which can be identified with what neurophysiologists call cognitive functions. Then we can define anaesthesia as the effect of pharmacological agents on this cognitive or memory-consciousness forming activity of the brain. Measuring anaesthetic effect by only one of these two components, then, by definition, can never be complete.

Declaration of interest
None declared.

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Enhanced recovery from surgery in the UK: an audit of the enhanced recovery partnership programme 2009–2012

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Editor—We read with great interest the paper by Simpson and colleagues1 reporting the nationwide experience of enhanced recovery programme (ERP) in the UK. We congratulate the authors for this important report coming from the real clinical life. Nevertheless, we have some comments on the internal validity of the study and the features not explored by their analysis. Beyond the limitations of the study (well discussed by the authors) related to 34% of missing data for the implementation analysis and 59% of missing data for the multivariate analysis, the paper confirmed the efficacy of ERP published in several studies including a large study in expert centres,2 by showing a close and significant relationship between the number of elements and the length of postoperative stay. The findings were less convincing in the patients undergoing gynaecological surgery. In our opinion, the lack of significant improvement in postoperative length of stay with ERP in gynaecology is probably as a result of the remarkably short stay before the implementation of ERP in the UK.

On the other hand, the main endpoint in the present study was the length of stay. But, one can ask whether this outcome is really the only appropriate endpoint to assess both ERP and the effectiveness of the partnership programme. The discharge from a given surgical unit is multifactorial and depends on many issues such as socioeconomic factors, patients’ personal factors, and mainly the availability of post-discharge support. In this way, the gap between the day when the patient fulfills discharge criteria (good pain control with oral analgesia, taking solid food, no i.v. fluids, independently mobile or the same as before admission) and the day when he/she actually leaves the unit of care, is a good marker of organizational aspects. Unfortunately, this data is lacking in the paper, while it could be informative on both the actual reduction of LOS with ERP and the possible local difficulties to discharge the patients. Furthermore even if the length of postoperative stay could be in some instances (i.e. gynaecology, oesophageal surgery, older patients) not shortened, the other benefits of ERP (lower morbidity, better quality of life, improved team work and patient satisfaction) remain important to achieve.3

Declaration of interest
None declared.