GRESHAM COLLEGE

27 FEBRUARY 2019

THE MYTH OF THE LONE HEROIC SURGEON

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Observations from A Clinician

The following notes accompany an exploration of operative surgery as an instance of teamwork. The lecture continues my examination of medicine as performance, focusing on the processes of clinical care rather than the scientific knowledge which underpins it. Much of the lecture will take the form of a conversation between me and the puppeteer Rachel Warr.

The first lecture in this series set out the proposition that clinical practice is one of many instances of expert performance, and that the acquisition of expertise can be framed as an extended journey which falls into recognisable stages. Starting with the traditional trajectory from apprentice to journeyman to master, I examined aspects of expertise that develop and mature over time. To do this I introduced examples of experts I have been working with for many years - a bespoke tailor, a hair stylist and a potter - whose practice sheds light on clinical learning and my own experience as a doctor. For all of them, the process started with 'doing time' and 'learning to see' before moving to internal shifts in how experts perceive and respond to those they are working for and with - their patients and their colleagues.

The second lecture focused on the clinical consultation, framing it as a 'close-up live performance with a very small audience'. In collaboration with the magician Dr Will Houstoun I explored the nature of such performance, where an expert works with an audience at close quarters, often within an individual's 'personal space'. The skills of gaining, sustaining, shaping and reshaping attention are key to a successful clinical consultation, and each consultation must close with a sense that progress has been made. Comparing clinical practice with close-up magic highlighted the multiple simultaneous narratives taking place within each encounter. Key to a successful consultation is a shift of attention from a performer (whether clinician or magician) to the person or people for whom that performance is designed (patient or audience). The recognition that 'it's not about you, it's about them' marks a pivotal shift in development within many professions that involve working directly with other people.

In this third lecture I turn to the operating theatre to explore the teamwork on which successful surgery depends. Again I set aside the scientific knowledge which surgery requires, focusing instead on its performance. I draw on my experience in the first phase of my career, when I trained as a general and trauma surgeon. For five years during that time I worked in Southern Africa, often in challenging settings and in conditions of uncertainty. Although much of a surgeon's work takes place outside the operating theatre (in clinics, on ward rounds and in providing postoperative care), in this lecture I will focus on operative surgery.

Operative surgery is often portrayed as a solo performance. Representations of surgery in film and television usually focus on the lead surgeon, framing others in the team as supporting players. It is easy to believe that surgery is 'all about' that one surgeon. While this often makes dramatic sense, the reality is quite different. Surgery is a team activity where members depend upon one another and where safety and success depend on close collaboration and mutual respect. Leadership within the team may take different forms in different contexts.

For many lay people, the word 'surgery' conjures a cluster of masked and gowned figures huddled around an unconscious form on an operating table. A hushed silence is broken by occasional terse commands issued by the chief surgeon and the atmosphere is tense and expectant as the patient's life hangs in the balance. The reality is very different. Most of the time surgical operations are routine, uneventful procedures carried out by a group of expert professionals who display exceptional team working skills as well as dexterity and precision. Although the lead surgeon carries ultimate responsibility for the patient, leadership is often distributed within the team. The fine motor skills of individuals play out within a highly trained ensemble built on attentive collaboration and mutual respect.

The scrub team (working directly within the patient's operative site) consists of the lead surgeon, assistant surgeons and the scrub nursing team, working closely together as surgical instruments and materials are passed to and fro. The anaesthetic team has different responsibilities and complementary skills. Each professional has a primary 'circle of focus', though these circles intersect and overlap. During an operation, normal 'social' forms of communication are altered or suspended. Eye contact, for example, is greatly reduced as team members are looking intently at their patient (either directly or via a screen) rather than at one another, while facial expression is often concealed by masks.

The nature of surgical performance is in flux, and established ways of doing are continually reconfigured by technical and social change. Until the 1990s, most major operations were 'open' procedures carried out under general anaesthetic. Organs were exposed directly though incisions into the body and team members' view was determined by line of sight. Often the primary surgeon and first assistant were the only members of the team who could clearly see the operative field. The team's engagement was with a depersonalised body, mediated through monitors and machines, and the 'personhood' of the patient could be bracketed out until the operation was over.

In the last thirty years, laparoscopic (keyhole) surgery has become the norm for many operations. Procedures are carried out through tiny incisions using long rigid instruments while miniature cameras display a magnified image of the patient's anatomy on operating theatre screens which all can see. Advances in anaesthesia (such as local and regional blocks) mean that patients now are frequently conscious while undergoing major procedures. This is profoundly altering the dynamic between patient as person and patient as body.

The opening up of this previously restricted view means that patients (if they wish) can see on the screen what the clinical team sees, as well as being aware of the team around them. Developments in interventional radiology mean that many procedures are carried out by means of flexible wires inserted at a distant site and steered into position under imaging control. Complex interventions on the heart or brain may be conducted through a tiny wire introduced through a distant artery in the wrist or groin. Paradoxically, as such procedures become more remote, the patient becomes more present.

Alongside these developments in the technical aspects of surgery, surgical teams are changing. Traditional notions of hierarchy, authority, deference and control are being redefined. Many operations are performed by 'transient teams', whose members may meet for the first time at the start of a major operation. Each member is performing to others in the team, as well as to the patient. Within such transient groupings, shared practices built up over years of working in a stable team can no longer be taken for granted and must be negotiated afresh on each occasion.

Underpinning all of this remains the need for team members to work together, communicating effectively without the usual cues of social interaction such as eye contact and facial expression. They must be able to 'read' one another's bodies as they stand huddled together around a vulnerable patient, coordinating their actions in a seamless surgical choreography.

This 'performative' aspect of surgery is often eclipsed by a focus on scientific knowledge and specific procedural skills. Yet there is much to be learned from performers outside medicine, especially those whose work combines teamwork with dexterity and fine motor precision.

Some years ago I met the puppeteer and dramaturg Rachel Warr. Her description of puppetry resonated with my experience of surgery. Rachel described highly trained professionals working together for a common goal, 'reading' one another's bodies as they manipulated strings and threads (as in open surgery) or rigid rods (as in keyhole surgery) under performance conditions, often having to respond to the unexpected and reacting in the moment to an unfolding situation. This has led to a longstanding collaboration where we draw on each other's expertise to shine light on what we thought we knew. This lecture will explore some of these areas of correspondence through conversation and demonstration.

Observations from A Puppeteer (Rachel Warr)

I am a puppetry director, dramaturg and puppeteer. My work spans a range of puppet types, including: rod, shadow, light, string marionettes, glove, object and Bunraku-style. Since 2013 I have been collaborating with medical professionals, principally looking at the work of surgical teams with Professor Roger Kneebone.

The disciplines of surgery and puppetry may on face value appear distant. Each discipline serves a very different purpose of course, but if one looks beyond this and focuses on the skillsets required by each, striking parallels emerge. This paper describes some of those parallels.

In general terms, to be successful in carrying out surgery or carrying out puppetry, a practitioner requires expertise in handling tools, manipulating materials and working in close co-ordination with other people. Different types of puppets (rod puppets, string puppets etc.) demand different techniques of the puppeteer; just so with different types of surgery. Thus in order to be specific, we need to draw connections between particular forms of puppetry and particular forms of surgery.

Open Surgery and Bunraku-Influenced Puppetry

There are close parallels between skills required in open surgery, and in puppetry inspired by Bunraku-style technique.

Bunraku, or Ningyō jōruri, is a form of puppetry from Japan, which originates from the early 17th century and is still performed in its traditional manner in Osaka today. In recent years some of the principal techniques of Bunraku have reached Western European puppeteers who have been inspired to apply these techniques in their work (my references below are based on this).

In Bunraku, a team of puppeteers operate a single puppet. The hands of the puppeteers have direct physical contact with the limbs of the puppet. Each puppeteer is responsible for moving a different part of the puppet's body; the puppeteers must work in concert with one another to ensure the puppet moves with a unified fluency.

When Professor Kneebone and his team first explained to me, through demonstration, the physical positions and individual responsibilities of those carrying out open surgery in an operating theatre, it was immediately apparent that there were similarities with Bunraku.

The physical grouping of the team (standing in close proximity to one another, sometimes in positions of physical discomfort for extended periods of time, in order to facilitate the task) was reminiscent of a Bunraku puppetry team. If I compared a snapshot of each of these two teams at work, I could almost transpose the image of one onto the image of the other. In addition, both teams focus their gaze on a shared point (the patient or the puppet) and rarely at one another. In puppetry this is a fundamental aspect of giving focus and thus life to the puppet. This focused gaze, on the task and not the other individuals in the team, demands a shift in methods of communication. Instead of relying on vocal and facial expression, these teams learn to communicate through nuances of movement or rhythm. Moving in co-ordination as a unit is key to the success of the work. Particularly as these teams need to be proficient not just in carrying out the rehearsed choreography of a series of actions, but also in improvising together in response

to shifts in the patient, or in puppet and audience. In both examples, breath is a guiding factor in the rhythm of the team; the breath of patient or the breath given to a puppet as it's impetus for movement.

The team structure in surgery and Bunraku is also similar. Both include a leadership role (lead surgeon / puppeteer working the puppet's head and hand) who makes decisions and sets the pace. A role providing physical support (the assisting surgeon often applies tension to hold a clamp or part of the body in place, similar to the puppeteer providing tension to the torso of the puppet). And there is a role facilitating the movement (the scrub nurse who fields the instruments and swabs to and fro during the operation, similar to the puppeteer working the feet of the puppet). There are other members of the team, a step removed from the patient's body or the puppet, the anaesthetist or circulators in surgery, those voicing the puppet, or changing the scenery in traditional Bunraku.

This team structure is what I call a flexible hierarchy. There is a defined hierarchy but there are specific moments where the role of leadership must pass seamlessly between different members of the team. For instance, if puppet is seen to slip on ice then the head is no longer making the decisions, instead the feet take a more dominant role and thus the puppeteer operating the feet is given space to lead. For instance in surgery, the scrub nurse is officially the advocate of the patient and has the authority to tell a surgeon not to lean too heavily on a patient while carrying out the operation.

In the last decade or so, surgical teams in the UK have moved from working in fixed teams (with the same colleagues), to working in transient teams (where individuals may be working with people they have never met before). It is a challenge to instantaneously work as an effective team. This is similar to the application of Bunraku-inspired puppetry in Western theatre. Puppeteers are often put together for a project and are expected to work as a team of puppeteers within moments of meeting. This is unlike the tradition of Bunraku in Japan where puppeteers will work as one team for a lifetime.

Laparoscopic Surgery and Long Rod Puppetry

Laparoscopic (key-hole) surgery and long rod puppetry also share similarities. In both instances practitioners operate at a distance via a rod(s). The benefits of this are, for medicine, less invasive surgery, and for puppetry, a greater distance between puppeteer and puppet. However these benefits are tempered by some specific challenges for the practitioner. These are:

- Loss of haptic feedback (sense of touch)
- Restriction of practitioners' movement
- Decrease in visual access

In laparoscopic surgery and long rod puppetry, there is a loss of haptic sense compared to the direct contact of open surgery or Bunraku style puppetry. Practitioners have limited physical feedback of the material being handled through the rod.

The practitioners' own movements are restricted. There is a greater reliance on small localised movement, such as a twist or flex of the wrist and the application of pressure on a trigger mechanism. The smaller circumference of movement afforded can lead to high levels of tension in the upper body, and I have witnessed surgeons and puppeteers complaining of muscle strain in the same parts of their hands and arms. Dexterity is mediated through the rod and mechanism, which can either magnify or diminish movement and force. Practitioners have to develop an embodied awareness of how much or little force is required to affect different tasks. This is not always intuitive and it takes practice to achieve fluency.

The comparison between laparoscopic surgery and rod puppetry is particularly relevant with long rod puppetry for TV or film, where the gaze of the puppeteer shifts from puppet to TV monitor (so that the puppeteer can see what the camera is capturing). In laparoscopic surgery the surgical team's gaze shifts from the patient's external body to a

monitor (showing images relayed from the camera inside the patient's body). In both instances, practitioners have to interpret 3D movement portrayed in 2D form.

A key difference between the two disciplines is that a laparoscope is operated pointing down with the surgeon above, whereas long rod puppets are often (but not always) angled upwards or forwards, with the puppet on a level or above the puppeteer. Nevertheless, the challenges faced and skills required are very similar.

Suture and string marionettes

Thread Management is the title of a series of meetings that brought a number of surgeons with a particular interest in suture (working in vascular surgery, heart surgery and paediatrics), together with a wide group of arts practitioners who use string or thread in their work, in my case work with string marionettes (https://vimeo.com/109053078; https://vimeo.com/123221514).

A marionette is puppeteered through vertical strings, with gravity providing a countering tension. It requires considerable sensitivity in the hands of the puppeteer to read the resistance or momentum of the string, and bring control and meaning to the movement.

A marionette must be strung with the correct levels of thread tension in order for it to stand and to move with accuracy. During the Thread Management meetings the group were invited to explore stringing and puppeteering a marionette. Through this and other activities, the group shared insight on types of thread; types of knots; tying knots with one hand; working at depth where access for hands is limited (tying a knot inside a puppet body or inside a tiny premature baby during an operation); ways of countering or controlling twists and tangles; sensing and controlling thread from distance; when to have taut or slack thread; avoiding snagging, pulling or tearing at the material it is threaded through; storing and maintain threads.

Handling Surgical Instruments and Object Puppetry

Object theatre involves puppeteering pre-existing objects (e.g. a fork, a hammer, a scarf). In surgery there is a great deal of handling objects, from surgical instruments to hypodermic needles to swabs. During operations surgical staff pass objects between one another, transferring an object from one pair of hands to another seamlessly is a skill in its own right.

During our collaboration we have spent time exploring how our different training prepares our hands to handle objects effectively. I think it possible that in medical training the instrument or tool is less in view than the purpose it serves. And that training is confined to learning the physical action needed to fulfil that purpose. In puppetry the tool or object is our means of expression and communication, so we are very aware of the tool or object itself. We take time to explore all the possibilities it offers, we formally explore how it sits in the hand, how it can used or manipulated in different ways, how it might be perceived by others. We go beyond the object's obvious range to gain a familiarity of it and confidence with it.

Notions of Performance

If we think of performance as someone carrying out a defined activity, and heightening or lessening some aspect of themselves to do so, while others are present and watching; then both surgery and puppetry involve performance. Recognising this enables us to address issues such as preparing for performance, coping with nerves, managing extremes of adrenalin and an absence of it in the aftermath. Those who refer to themselves as performers have mechanisms built into their training and their process to try to manage these. I am sure those working in surgical teams do too. I have observed a particular area where puppeteers have a mechanism to support them, but surgeons do not. That is 'warm up'. Performers, just like sports people, stretch their muscles before they perform. Puppeteers pay particular attention to warming up the muscles in their hands, arms and backs. The nervous trembling of a hand

is magnified through a puppet, preventing the puppeteer from doing their job effectively. 'Warm up' helps puppeteers to be physically and mentally prepared for the task ahead, it increases the range of dexterity in their hands, and it helps to prevent strain or injury. While surgeons scrub up, they do not 'warm up' their hands.

Some Differences

I have talked about parallels between the skills required in surgery and puppetry. I shall briefly talk about differences. It seems to me that a main difference between the two is the approach to training. It seems curious to me that surgeons train together, scrub nurses train together, only once they begin work are they in the same room. This is not the case with puppeteers, but then puppeteers have the luxury of being able to switch roles. This provides them with experience of the challenges faced by each role.

In the puppetry training I am familiar with in the UK, puppeteers train not just to be skilled operators but also adaptable team players. Much theatre work in the UK is created through a process of devising and rehearsal, and being collaborative is something directors and colleagues look for in each other. Feedback is a constant, it feeds into every part of our process, and it is not one way. We work to create an environment where feedback is given and received with ease, and where there is shared ownership of problem solving, success and failure.

A Final Word

It is easy to become bound up in a particular way of thinking, defined by years of practice in one discipline and surrounded by colleagues who are part of the same environment. The potential danger is that this leads to rigid thinking and a lack of innovation. But by looking outwards, investigating connections across different traditions and disciplines, by exchanging knowledge, it is possible to look inward with new eyes. My collaboration with Professor Kneebone has certainly enabled me to do this in my own work, and I would like to thank him for generously sharing his curiosity, enthusiasm and insight.

Further Reading

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With thanks to the library at the Institut International de la Marionnette, Charleville-Mézières, France.
With thanks to the Little Angel Theatre for the loan of some puppets.

Links

World Encyclopedia of Puppetry Arts, UNIMA. https://wepa.unima.org/en/