



GLYN WILLIAM HUMPHREYS

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1954–2016

GLYN HUMPHREYS WAS A distinguished and influential figure in British neuropsychology and cognitive science. Born on 28 December 1954, Glyn was brought up in Aughton, West Lancashire. The family was academic, with Glyn's father working as a Lecturer in Building Management at Liverpool University; after primary school, Glyn won a scholarship to Merchant Taylors' Boys' School in Crosby. From his earliest years, Glyn was a person who jumped into life's opportunities, with a flair for organisation and for inspiring and including those around him. He was keen on all kinds of competitive sport, from beach games during the traditional family holidays in North Wales to the cricket matches that he continued to organise well into his fifties, and was a lifelong undeterred enthusiast for the triumphs and more frequent woes of Everton FC. An amateur guitarist and recorder player, in his adolescence he was the one to organise long jam sessions at the family home, and forty years later, now working long hours in his academic career, was still playing the recorder and organising the neighbourhood choir in Birmingham. Always ready for a challenge, to seize an opportunity, and to encourage and inspire others, Glyn became a mainstay of his discipline in the UK and abroad, with a staggering record of research productivity, influence and professional service.

In the early 1970s, psychology was still an unusual choice of degree topic. In his teens, Glyn had joined friends to volunteer on Sundays for work in a hospice for young children with psychological problems, as well as working at the Camphill Community for people with learning disabilities on the North York Moors. Perhaps influenced by these experiences,

Glyn elected to study psychology at the University of Bristol, where he obtained a First as an undergraduate, then continued into his PhD.

Along with attention and consciousness, one early interest was the perception of letters and words. Before the introduction of laboratory computers, a key piece of equipment was the tachistoscope, allowing extremely precise control over stimulus presentation and timing. To use a tachistoscope, dozens or hundreds of stimulus cards had to be prepared by hand; on each trial, selected cards were slotted into the machine which then revealed them to the subject in a controlled order and for controlled times. With another student in Bristol, Lindsay Evett, Glyn developed a tachistoscopic procedure for examining how letter identities combine to determine word recognition. In this 'four field' procedure, each trial began with a nonsense stimulus used as a 'mask', followed by a brief letter string or 'prime', a brief word which the subjects were to identify if they could, and finally the mask again. Under these circumstances subjects were largely unaware of the prime but, still, the word was identified better if the prime shared some of its letters. This happened even when prime and target were in different cases, with little visual similarity between them, and especially when prime and target letters were in the same positions *relative to string ends*. Carried out in the early days of cognitive psychology, these experiments remain intriguing for the light they cast on abstract letter coding, word reading and consciousness.

With this strong academic start behind him, and interests already in perception, attention and consciousness, Glyn moved to London in 1979 to take up his first academic job at Birkbeck College. At Bristol Glyn had already married his first wife, Pauline, but the marriage had not lasted. In London in 1981, Glyn met Jane Riddoch, a young clinical neuropsychologist then studying for her PhD. Among the most striking cognitive disorders that can follow damage to one side of the brain, usually a stroke in the right hemisphere, is a tendency to ignore or neglect the opposite side of space. Such unilateral neglect can cause a patient to ignore somebody speaking on their left side, to leave one side of their face unshaven or without make-up, to draw just half-objects from memory. When Jane introduced Glyn to some of her patients, he was immediately fascinated, and from this point on their private and research lives were intertwined. They were married in 1984, raising two young sons from Jane's previous marriage, Iain and Alec, and their daughter Katie. At the same time they became lifetime collaborators, with new ideas constantly sparked by the many kinds of neuropsychological patients daily encountered in the clinic. Over the next thirty-five years, Glyn's work involved many different people

using many different methods, but the core was neuropsychology and his work with Jane.

In one of their first projects together, they began their lifetime interest in object recognition, and also a lifetime friendship with 'patient HJA'. Though, like many neglect patients, HJA had suffered a stroke, the effects of this stroke were restricted to the rear part of the brain, the occipital lobes, with their core role in vision. He was left not with neglect but with agnosia, a severe disturbance in the ability to recognise visually presented objects such as a guitar or an owl. Since the nineteenth century, agnosias had traditionally been divided into two forms, 'apperceptive', or a disturbance in constructing the visual percept, and 'associative', or inability to attach meaning to the shape that was seen. An apperceptive agnostic, for example, might be unable even to copy a drawing, while an associative agnostic would copy well but still be unable to say what object had been drawn. HJA, however, fitted neither of these categories perfectly. His knowledge of object shapes in itself was good, as he could draw well from memory. His copying was also good. His core problem appeared to be dealing with the separate parts of an object and integrating them into an organised whole, a deficit Jane and Glyn called 'integrative agnosia'. For example, quite unlike a person with normal vision, HJA recognised silhouettes of objects better than objects with fully drawn details, as if the details themselves created confusion. Over the next twenty-six years before HJA died, Glyn and Jane published over thirty papers and two books based on his impaired and preserved visual abilities. Becoming firm friends with their patient and his wife, they would travel monthly to Guildford to test him at his home, fitting the more strenuous testing into the mornings before the large sherry that HJA enjoyed before lunch. For Glyn and Jane, this work launched a lifelong research interest, pursued using many different approaches, in the component processes and stages by which the visual system transforms the image on the retina into perceived objects and their relations. HJA also became one of the few neuropsychological patients to be followed over decades, bringing new insights into long-term visual representations. As the years went by, for example, his ability to draw objects from memory gradually degraded, as if details were progressively lost now that new examples were no longer being recognised.

A second of Glyn's lifetime interests was visual attention, studied partly in patients with unilateral neglect, but also with many other techniques and approaches. Perhaps typically, my own work with Glyn began with a talk he delivered in Cambridge in the mid-1980s and a subsequent trip to the nearest pub to discuss his results. At this time, Anne Treisman

had just published her massively influential and important feature integration theory of visual attention. According to feature integration theory, elementary visual features such as colour, motion or size were perceived in parallel across the visual field. Serial attention to one object after another was needed to integrate these features into the correct conjunctions, ensuring, for example, that a pink O and green X were not perceived as a green O and pink X. One case of feature integration was supposed to be the organisation of shape parts into the correct spatial wholes—for example, the combination of horizontal and vertical letter strokes to form an L versus a T—but Glyn's data showed something wrong with this story because sometimes people could find a target T in a field of non-targets without serial processing, even though the non-targets were made up of just the same strokes (e.g. Ts rotated by 90 degrees). Glyn just had the knack of running interesting experiments and, with the help of a few beers, we decided that the critical factor was his use of a homogeneous non-target field, with the target standing out against the repeated, identical non-targets. With the help of a couple of years' further experiments, we moved to a new view of visual search, one based on competition between the elements of a visual display, with the target matching the needs of the task and hence competing strongly for attention, and grouped or similar non-targets supporting one another's rejection. Over the next ten years, Glyn and I worked to develop this competitive model and apply it to underlying brain functions. Competition, for example, proved a useful approach to understanding attentional impairments after brain damage, including the apparent disappearance of a stimulus on the side opposite to a brain lesion when it was accompanied by a second stimulus on the good or undamaged side. Visual search and feature integration remained mainstays of Glyn's work for the rest of his career. With Derrick Watson, for example, in the 1990s Glyn designed a new kind of visual search experiment, revealing some elements of the display before others and showing sustained, active inhibition of these early non-targets. In a paper published in 2013, Glyn and Jane returned to feature integration theory, using visual search to show hard-wired brain coding of familiar feature conjunctions, such as a red tomato or yellow corn.

Beyond visual search, Glyn used many other methods to study attention and its impairments. Much of this work developed his early interest in unilateral neglect, and its many fascinating variations. Sometimes, for example, a patient might ignore everything drawn on the left half of a sheet of paper, but in other cases it is the left half of each object that is ignored, even the left half of an object drawn on the right

side of the sheet. In early work with Jane, Glyn showed the dissociation between these two forms of neglect, and later with Pia Rotshtein worked on the different kinds of brain lesion involved. Linking to our early work on visual search, much of this neglect work also addressed the effects of similarity and grouping; often, an object that is ignored when it occurs in isolation on the left can be rescued if strong perceptual cues group it to a second object on the right. Grouping also became a core theme in work with a second patient who became a lifetime friend, the simultanagnosic GK. In unilateral neglect, one side of the brain is damaged and information on the opposite side of space is ignored, reflecting each hemisphere's largely contralateral representation of space. In simultanagnosia, there are lesions to both sides, and the result is an extraordinary tendency to see only one small part of the visual field at once, leaving everything else apparently invisible. Glyn and Jane began work with GK while still in London, after he was referred to them by a student on Glyn's neuropsychology Masters course. His impairments were so major that he was registered legally blind, walked with a cane and had at one stage been transferred to a blind rehabilitation centre. GK, however, was not blind, just massively simultanagnosic, and over more than twenty years of work with him, Glyn and Jane documented just what it was that he could and could not see. For example, if GK was shown two outline squares, one more perceptually intact than the other, he would see just the more intact shape and deny that the other was present. When the competing, better shape was removed, however, now GK could see the remaining square perfectly well!

Beyond neuropsychology, Glyn was always alive to new ways of understanding attentional functions and limits. In the 1980s, there was an explosion of interest in understanding cognition through connectionist models, and with Hermann Müller Glyn soon developed his own connectionist model of visual search, based on a process of grouping together parts of the visual field with shared properties, then rejecting whole regions as a single chunk. A second major connectionist model, published with Dietmar Heinke in 2003, addressed roles of objects and space in neglect. Another complement to neuropsychology was transcranial magnetic stimulation or TMS, using magnetic pulses delivered over the scalp to reduce activity in the underlying brain tissue temporarily. In a long collaboration with Carmel Mevorach, Glyn used TMS to overturn conventional thinking about the complementary roles of left and right parietal context in attentional selection. Often, it has been thought that the right hemisphere directs attention to more global, large-scale aspects

of the visual input, while the left hemisphere directs attention to local detail. Often, however, it is the global aspects of a display that are more physically salient, and using TMS Glyn and Carmel found that salience is crucial. Their evidence suggests that, instead of adjudicating between global versus local, the right hemisphere permits a natural bias to whatever is most salient, while the left overcomes this to allow focus on something less salient but more important.

Though attention and vision were core topics for Glyn, there was always much besides. With Jane he shared a lifetime interest in action, including the impairments in reaching, grasping and goal-directed action planning that can follow damage to parietal and frontal lobes, and the way attention is influenced by visual prompts to action, such as the orientation of a handle. Beyond simple reaching and grasping, they went on to show how attention depends on perceived functional relations between two objects. For example, a patient who has trouble seeing both of two objects in a brief display, such as a cup and a jug, may suddenly do much better when these are positioned to suggest their usual functional interaction (the jug pouring into the cup). Glyn's interest in vision fed into a further interest in the neuropsychology of semantics, and the intriguing finding of patients whose knowledge of some objects, for example living things, is impaired while knowledge of other categories is preserved. Glyn believed that knowledge is organised at many levels, from visual features to many kinds of associations, that different aspects of knowledge interact as meaning is retrieved, and that impairments—for example, in knowledge of visual features—will selectively affect some object categories more than others. Towards the end of his career, with Pia Rotshtein, Glyn developed an interest in social cognition, and in particular the concepts of self versus other. The experiments had all Glyn's usual ingenuity and surprise value. Participants first learned associations between geometrical shapes and one of three personal labels—self, friend, stranger—and then in a series of trials had to decide whether shape–label pairs were consistent with the previously learned association. Though shapes and their labels were arbitrary, and without real meaning outside the context of the experiment, still people showed a strong focus on the self, with much faster decisions for 'self' pairs.

Towards the end of his career, too, Glyn and Jane turned increasingly to the clinical application of neuropsychological knowledge. For them, work with patients had always meant personal commitment, from lifetime friendships with HJA and GK to regular events organised for the many

patients and carers that Glyn, Jane and their groups worked with, stimulating interest in research and feeding back its implications for the patients' lives. In 2014 they published the BCoS (Birmingham Cognitive Screen), a comprehensive screen for common neuropsychological impairments, and began actively promoting its use within the NHS and internationally. This was followed by a shorter version, the OCS (Oxford Cognitive Screen), which Glyn dreamt would become internationally accepted as the standard tool for stroke assessment, and which already is used in more than a dozen countries worldwide. With Tom Manly, Glyn, at the time of his death, was working on a tablet-based version, aiming to remove the burden of paper tests from busy clinical neuropsychologists and occupational therapists.

Glyn's commitment and productivity were simply awe-inspiring. Over a career approaching forty years, he published over 650 research articles, along with eighteen authored or edited books, and held over eighty research grants. At the age of just thirty-four, he took up his first head of department post at Birkbeck, soon afterwards moving to become head of department at the University of Birmingham, where he remained for over twenty years. Under his stewardship, Birmingham built up one of the country's premier psychology departments, with state-of-the-art facilities and world-leading staff. In 2011, Glyn moved to lead the UK's top department at the University of Oxford. He had unswerving commitment to the discipline, founding a new journal, *Visual Cognition*, and later serving as the first non-US editor of his field's premier empirical journal, the *Journal of Experimental Psychology: Human Perception and Performance*. At the same time he poured effort into committee and consultation work, serving in 2014 as Chair of the Research Excellence Framework panel for Psychology, Neuroscience and Psychiatry, from 2002 to 2004 as President of the Experimental Psychology Society, and from 2012 to 2014 as President of the British Neuropsychology Society.

As their ideas became established, and their students and post-docs moved to set up their own laboratories, Glyn and Jane also took their family to visiting positions around the world—the University of Waterloo with Derek Besner in 1983 (a long daily commute with the boys listening to Glyn's self-recorded *Star Wars* tapes); the Montreal Neurological Institute with Andrew Kertesz in 1988; Paris in 1992 to begin a long-term collaboration with Muriel Boucart; Bologna with Elisabetta Ladavas in 1997; Leipzig in 1998 with Glyn's former post-doc Hermann Müller; the Salk Institute in 1998 to discuss feature integration theory with Francis

Crick; Melbourne in 1999 with Umberto Castiello; Peking in 1997 and again in 2005–8 with Lin Chen (equipment kept under draperies to protect from sandstorms); Granada in 2009 and 2011 (police escort to their accommodation in the Albaicín); and Hong Kong in 2013–16 to work with Brendan Weekes developing Cantonese and Mandarin versions of their cognitive screen.

Glyn's influence was recognised in a lifetime of awards in the UK and overseas—including the Spearman Medal from the British Psychology Society in 1986; Leibniz Lecturer at the University of Leipzig along with the Humboldt Research Award in 1998; British Psychological Society President's Award in 1999; Honorary Member of the Belgian Experimental Psychology Society in 2002; Special Professor at the Chinese Academy of Science in 2011; Distinguished Professor at the University of Hong Kong in 2013–16; Broadbent Lecturer of the European Society for Cognitive Psychology in 2013; and British Psychological Society's Lifetime Achievement Award in 2015. He was elected Fellow of the British Academy in 2009. A sense of his research contribution is given by his book *Attention, Perception and Action: Selected Works of Glyn Humphreys* (London, 2016), which brings together some of his most influential works published between 1987 and 2014.

Though their work programme was ferocious—typically, Glyn and Jane worked together until ten o'clock, paused to watch the news and then returned to their laptops—they remained equally uncompromising in the time devoted to personal and family lives. Running, swimming, cricket, music, family holidays, children, grandchildren all received the same attention; visiting their home, it was not rare to find Glyn running out to buy food, Jane placing a painting or new piece of furniture, and several grandchildren playing in the kitchen. Somehow, too, there was a striking air of calm, and always time to add one more professional or family demand into the mix.

Both literally and metaphorically, Glyn never stopped running and, sadly but appropriately, on 14 January 2016 he died of a heart attack while out running in Hong Kong. With his death, cognitive neuroscience lost one of its most active, productive and broadly influential figures. Within a few days, messages flooded onto his memorial website from around the world, filled with the gratitude of the countless young scientists he had encouraged and inspired. These messages paint a picture of a true gentleman, always racing between commitments but always with time for the people who needed him, with unswerving focus on what needed to be

done coupled to a modest, gentle manner and characteristic twinkling eyes. There are few areas of our discipline that were not influenced by his energy and ideas; he helped to shape a generation, and will be affectionately and admiringly remembered.

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