

## ***Case 8: Alcohol-related brain damage***

### **KEY FACTS AND FIGURES:**

- Alcohol-related brain damage (ARBD) describes changes in brain structure and function caused by chronic alcohol consumption in the absence of well-characterized alcohol-related conditions such as Wernicke's encephalopathy (WE) and Korsakoff syndrome (KS).<sup>1</sup>
- Neurological dysfunction in ARBD, WE and KS is related to thiamine (vitamin B1) deficiency. In people who abuse alcohol, there is reduced dietary supply of the vitamin due to malnutrition and malabsorption. Additionally, liver damage leads to poor storage and processing of thiamine.<sup>2</sup>
- The prevalence of ARBD varies considerably across studies. Prevalence is reported to be 21% among homeless hostel dwellers in Glasgow.<sup>3</sup> The prevalence of ARBD in new and old long-stay mental hospital patients in Scotland is 9% and 5%, respectively.<sup>4</sup> It is estimated that 35% of those with alcohol dependence will exhibit post-mortem evidence of ARBD.<sup>5</sup> The more severe Wernicke-Korsakoff syndrome (WKS) occurs in 1-2% of the general population in the United States.<sup>6</sup> The prevalence of WKS has decreased in countries that have instituted nationwide thiamine enrichment of staple foods such as bread.<sup>7</sup>
- ARBD affects people in their 40s and 50s, with women presenting a decade younger than men.<sup>5</sup> In a clinical sample of 51 patients with Wernicke's encephalopathy, 78.4% were male. The median age at diagnosis and death were 57 years and 65 years, respectively.<sup>8</sup>
- ARBD and WKS are associated with cognitive impairments (memory, visuospatial function), psychiatric and behavioural disorders (depression, apathy, agitation, aggression), and physical problems.<sup>9,10</sup> Confusion, ataxia, and ophthalmoplegia or nystagmus are the triad of clinical features associated with WKS, although only 16% of patients are reported to exhibit the full triad and 19% are reported to have no documented clinical signs.<sup>11</sup>

**Background:** Sammy (not his real name) is 51;7 years old. He is divorced and has a 20-year-old daughter. His daughter lives locally to him but they are estranged from each other. Sammy formerly worked as an upholsterer and owned his own upholstery business. He left school at 16 years of age. Sammy was diagnosed with ARBD in April 2019. He has a history of excessive alcohol consumption, beginning in adolescence and persisting throughout adulthood. Sammy was drinking up to 180 units per week. This has resulted in several hospital admissions to treat injuries related to falls and to supervise withdrawal from alcohol. In February 2018, Sammy was admitted to hospital for the treatment of eight broken ribs, a serious injury that was sustained in a fall down the stairs at his home. The hospital admission during which he was diagnosed with ARBD occurred between 6 April 2019 and 1 May 2019. This admission, which was an emergency, was prompted by alcohol withdrawal seizures. Sammy's first seizure occurred in his parents' home and the second one took place in the emergency department of his local hospital. Both seizures were self-limiting. During his stay in hospital, Sammy was under the care of a gastroenterologist and the hospital's Alcohol Awareness Team.

**Clinical symptoms:** Sammy's admission to hospital followed a period of heavy drinking that stopped one day prior to his seizures. On admission, he was in a state of agitation and was administered 1mg Lorazepam. He made a full recovery from the seizures. He was commenced on Pabrinex, fluids and Librium (Chlordiaepoxide). (Pabrinex is an injection that contains vitamins B and C that may be started in the emergency department to prevent Wernicke's encephalopathy. Librium is used to treat withdrawal symptoms from alcohol.) Sammy received prolonged treatment with Pabrinex as the medical staff suspected WE. He was diagnosed with hypokalaemia (low level of potassium in the blood serum) and hyponatraemia (serum sodium less than 135mmol/L), both of which resolved. His electrocardiogram (ECG) displayed a prolonged QTc. (The clinical significance of a prolonged QTc is uncertain, as there is no consistent evidence for increased risks of total or cardiovascular mortality or of sudden death associated with prolonged QTc interval.<sup>12</sup>) Sammy obtained a score of 17/30 (moderate cognitive impairment) on the Montreal Cognitive Assessment (MoCA) on admission to hospital. Eleven days later, on 17 April 2019, his MoCA assessment was repeated and he scored 22/30 (mild cognitive impairment).

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During his stay in hospital, Sammy underwent computerized tomography of his brain. There was no evidence of a focal intraparenchymal mass lesion on this unenhanced study. There was a background of bilateral cerebral and cerebellar atrophy. He also developed a left axillary abscess. This had been previously drained in hospital and recurred while Sammy was an inpatient. He was commenced on flucloxacillin and the site was dressed daily. He continued taking antibiotics for 10 days in total. Sammy's sister reported that he was extremely ill as an inpatient. He became incontinent, very weak and was confused. She said he repeated himself to excess and at one stage thought that his deceased brother had come to visit him. Sammy's difficulties with alcohol consumption were evident while he was in hospital. Bottles of whiskey and beer were found in his room by the occupational therapist and nursing staff. He did not appear to understand how inappropriate this was in a hospital setting and when he was being treated for detoxification. Sammy left the ward multiple times a day supposedly to smoke cigarettes, but there was a strong suspicion among ward staff that this was to drink alcohol. Sammy claimed that he did not realise that it was wrong to do this in hospital. He was visited multiple times during his admission by substance misuse liaison staff. He was also followed up by them on discharge.

Sammy was assessed by the medical team as having capacity and as medically fit for discharge. He was discharged from hospital to his parents' home where he received help with practical activities of daily living and medication. On discharge from hospital, Sammy was still taking flucloxacillin. He was commenced on thiamine and vitamin B compound strong tablets. He was also taking paracetamol and using tears naturale for dry eyes. An outpatient ultrasound scan of his liver was arranged because of deranged liver function tests (GAMMA GT scores in excess of 500) and suspicion of cirrhosis. He was advised not to drive.

**Daily activities:** Prior to his most recent hospital stay, Sammy struggled with all activities of daily living. His work duties were compromised by extended periods of inebriation. He was often unable to shop for food and cook regular meals. As a result, he experienced poor nutrition. He had a loss of appetite and was frequently unable to finish a meal. During periods of heavy drinking, Sammy did not attend to personal hygiene. He relied on the assistance of a friend to maintain the cleanliness of his house. Sammy had financial difficulties and was

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frequently behind in the payment of bills. His social relationships were also negatively affected by his drinking. Membership of his local golf club was cancelled after he had several confrontational encounters with other members and staff. His housemate found alternative accommodation following a series of arguments with Sammy. Sammy was unable to find another tenant to share the rent and eventually had to leave the property.

After discharge from hospital, Sammy's sister became directly involved in his care. She found him rented accommodation and furnished it for him. Sammy now lives within walking distance of his parents' house and the home of another brother. Sammy's sister also took charge of his finances. She applied for social security benefits on Sammy's behalf as he was no longer able to work. Sammy receives access to the local food bank. His sister also arranged for carers to visit him twice daily to check on compliance with medication. Sammy is also under the supervision of an addiction support worker. He was able to abstain from alcohol immediately after discharge and while he was staying with his parents. However, he has been unable to maintain abstinence while living independently. Recently, the relationship with his sister has deteriorated around financial issues. She is no longer assisting him with daily activities or managing his finances for him.

**Medication:** Sammy is taking two vitamin B compound strong tablets three times a day. He is also taking one thiamine 100mg tablet three times a day. Carers visit Sammy twice a day to ensure that he is taking his medication as directed.

**Communication:** The author visited Sammy at his home in the afternoon of 17 August 2019. He was 3.5 months post-discharge and had just moved into his new house. His sister had managed to furnish most rooms in the house although some further work was still required. Sammy was physically well and had attended the outpatient appointment for the ultrasound scan of his liver the day before. He had found this a very stressful experience as he and his mother struggled to find the health facility where the procedure was performed. Sammy spoke in a positive way about plans for his future. He showed the author around the outside of his house where there were two sheds. He intended to upgrade these sheds and use them to resume his upholstery work. He also wanted to join the local golf club and had already

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taken out gym membership. He was still smoking and had occasionally lapsed and consumed alcohol. He was talkative and cooperative throughout the test session. He requested a break in the audio-recording so that he could go outside to have a cigarette.

Sammy had normal speech production skills. There was no dysarthria or apraxia of speech. His articulation of speech sounds was intact. He had normal resonance and breath support for speech and used prosodic features such as intonation and stress appropriately. He spoke fluently and had normal voice quality. There was no evidence of phonological impairment. Sammy did not report any deterioration in his speech as a result of his recent illness and hospitalisation. His mother and sister also thought that his speech had remained unaltered following his illness.

Sammy obtained a phonemic or letter fluency score of 11 words in 60 seconds. This is slightly lower than might be expected based on published data. Gross *et al.* (2010) examined letter fluency in 588 men and women who participated in the Johns Hopkins Precursors Study – an investigation that examined associations between prospectively collected information about alcohol consumption ascertained on multiple occasions starting at age 55 years on average with domain-specific cognition at age 72 years.<sup>13</sup> The participants in this study were all graduates of the Johns Hopkins Medical School. The average letter fluency score for the letters F, A, S was 42.5 words (or 14.2 words for a single letter). ARBD is known to disrupt executive function skills.<sup>14</sup> It is likely that Sammy's score reflects some impairment of these cognitive skills and is consistent with his reduced performance on the MoCA.

Sammy displayed intact production and comprehension of morphology. He used inflectional and derivational morphemes with ease: *cruise liners*s (plural inflectional suffix); *soft furnis*hings (derivational suffix + plural inflectional suffix); *cheape*r (comparative inflectional suffix); and *concentrat*ion (derivational suffix). Expressive and receptive syntax was also an area of strength in Sammy's communicative profile. Sammy was able to understand questions with complex syntax that were posed to him. In the following exchange, the author (INV) uses a question that contains subject-auxiliary inversion (underlined) and two subordinate clauses, one a relative clause (SC<sub>1</sub>) and the other an infinitive clause (SC<sub>2</sub>):

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INV: Do you have any interests or hobbies [<sub>SC1</sub>that you like [<sub>SC2</sub>to pursue in your free time]]?

SAM: I'm just not fit enough [<sub>SC1</sub>to do [<sub>SC2</sub>what I want to do at the moment]]

Sammy's response reveals not only that he has understood what the author has asked him but also that he can make use of complex syntax. The utterance he uses in reply to the author also contains an infinitive clause (SC<sub>1</sub>) and an interrogative subordinate clause (SC<sub>2</sub>).

Sammy's lexical-semantic skills were relatively strong. When he omitted items or made errors during confrontation naming, his difficulties suggested a lack of prior exposure to target words and a possible effect of education on his naming. He was unable to attempt any response, for example, when shown pictures of uncommon vegetables like artichoke and asparagus. Other responses showed that he could provide a related, high-frequency lexical item in place of a low-frequency target word. When asked to name *French horn*, he responded "some sort of trumpet". When asked to be more specific, he replied "a bugle, some sort of wind instrument". Most of Sammy's naming errors, however, were visual in nature. For the picture of a pumpkin, he said "looks like a Terry's chocolate orange", only producing *pumpkin* when he was told that the target word occurred in the Cinderella story. Other visual errors included the following responses for the target words shown on the left of the arrows. In each case, there is a physical similarity, be it shape or markings, between the uttered word and the target word:

'skunk' → *badger*

'cherry' → *apple*

'chisel' → *paintbrush*

'lobster' → *locust* and *caterpillar*

Other naming errors were more clearly semantic in nature, such as the following examples:

'celery' → *cauliflower* (semantic field: *vegetables*)

'ant' → *fly* (semantic field: *insects*)

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'rooster' → *turkey* (semantic field: *bird*)

'tiger' → *leopard* (semantic field: *wild cat*)

'lobster' → *crab* (semantic field: *crustacean*)

A range of cues successfully elicited target words that Sammy was struggling to produce. A gestural cue prompted his production of 'flute', while an orthographic cue (the letter R) elicited the production of 'raccoon'. The picture of a tiger was eventually correctly named after use of an orthographic and a phonemic cue. Semantic cues were also used but were not always successful in eliciting production of a target word. For the target word 'pepper', the author used the following series of semantic cues. The first semantic cue produced no response. The second semantic cue produced a response that was not consistent with the first cue – pepperoni is a type of meat when Sammy was told the target word is a type of vegetable. It took a third semantic cue before the target word 'pepper' was produced:

**Target word:** *pepper*

'it's a type of vegetable' – no response

'it's on top of pizza' – responded 'pepperoni'

'it can be red, green or yellow' – responded 'pepper'

Sammy did not report any word-finding difficulties during conversation. However, his expressive language contained many indefinite pronouns like *somebody*, *anything* and *something* and other non-specific words like *stuff* and *thing*. Sammy used on average four of these words for every minute of his spoken contribution to the 42-minute audio recording. The author used these same expressions a total of 16 times during the interaction, a rate which was less than half that displayed by Sammy. This may simply reflect Sammy's pre-morbid communication style, or it may suggest that he is having some word-finding difficulty after all. Several examples of Sammy's use of these expressions are shown below:

"I was doing also done cars car trimming and stuff" (*conversation*)

"she's wringing out a cloth or something" (*picture description*)

"you know just concentration and stuff (.) is the thing" (*conversation*)

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That Sammy may have some difficulty with lexical access and retrieval is suggested by his performance on the semantic or category fluency task. Sammy produced 15 animal names in 60 seconds. Like phonemic fluency, this score is lower than might be expected based on published data. In the 588 participants in the Johns Hopkins Precursors Study, an average semantic fluency score of 18.3 animal names in 1 minute was obtained.<sup>13</sup> Horvat *et al.* (2015) recorded an average semantic fluency score of 22.3 animal names in 1 minute in 6,608 men and 22.2 animal names in 7,967 women, who were selected at random from population registers and electoral lists, and participated in the Health, Alcohol, and Psychosocial Factors in Eastern Europe prospective cohort study.<sup>15</sup> Sammy's superior semantic vs. phonemic fluency performance suggests that his difficulties with letter fluency cannot be accounted for by lexical access and retrieval problems alone – executive function deficits are making an independent contribution to these difficulties.

Aside from lexical semantics, Sammy was able to produce and understand meaningful sentences. His utterances contained different participant roles (e.g. agent, patient, instrument). Sammy was able to establish meaningful relations between phrases and clauses in sentences using prepositions and conjunctions that expressed a range of concepts. These concepts included *time* and *space* and complex relations such as those represented in italics below:

*Reason: 'because'*

"golfing trips were in Ireland '**cause** it was an Irish golfing society that I was playing with"

*Comparative: 'as'*

"there's not the same quality **as** there used to be"

*Concessive: 'even though'*

"**even though** [...] probably where the drinkin' was concerned and stuff ah (1:65) you know you could have managed but you still weren't doing it right"

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Sammy displayed strengths and weaknesses in pragmatics. An area of pragmatic strength was his use and appreciation of humour. During the confrontation naming test, he responded with *crab* when shown the picture of a lobster, insisting they were 'the same thing'. He then went on to engage in humour based on word play between the meaning of 'crab' (a crustacean) and 'the crabs' (a slang term for a sexually transmitted infection):

"it's a lobster, a crab, it's the same thing, they are, but then if you've got the crabs, you don't say you've got the lobsters!"

Sammy made context-appropriate use of laughter during banter with the author. Below, talk about slowing down with advancing age is punctuated with episodes of laughter:

SAM: you name it I just loved playing sports all the time

INV: right okay but you will get back into a lot of these things once you get recovered

SAM: might be a bit slower like but (*laughter*)

INV: well none of us are twenty any more, sure we're not? (*laughter*)

SAM: we think we are but, don't we? (*laughter*)

Sammy was able to identify and correct misunderstandings when they occurred. During conversation about his favourite movies, Sammy said he liked thrillers. The author incorrectly took this to include horror movies, a misunderstanding that was quickly corrected:

INV: what sort of movies or films do you like?

SAM: maybe action movies yeah things like that thriller, thriller movies and stuff like that

INV: right so thrillers and horrors

SAM: don't like horrors

In the following extract, the author clearly understood that Sammy went to Canada *for the purpose* of playing golf. However, this was also a misunderstanding that Sammy was able to identify and correct:

INV: that must have been some trip going off to Canada to play golf

SAM: I suppose it, it wasn't to play golf [...] I ended up playing golf when I was there

To correct these misunderstandings, Sammy was able to monitor his hearer's mental states and identify when these states did not adequately represent the message that he wanted to convey. This suggests that at least some of Sammy's pragmatic language skills were supported by strong theory of mind (ToM) skills. This is further indicated by Sammy's revision of his utterance in the following extract. Sammy is aware that he has used the pronoun *they* without first establishing for the hearer a referent of this expression. Accordingly, he moves to repair his utterance by replacing the pronoun with the noun *people*:

INV: you're not bothered about anything to do with words

SAM: nawh they either get me, people either get me or they don't

In this example, Sammy displayed sensitivity to his hearer's ignorance of the referent of a pronoun in conversation. There were many other occasions in conversation where Sammy used pronouns in the knowledge that his hearer would be able to establish their referents in the prior discourse context. In the following exchange, the demonstrative pronoun *that* has as its referent the different jobs that Sammy undertook as an upholsterer. Moreover, the hearer may be expected to establish this list of jobs as the referent of the demonstrative pronoun:

INV: what sort of furniture did you upholster?

SAM: anything from (.) dining room chairs, settees (.) ah (1:83) just ordinary chairs, Parker Knolls everything, bar work, cruise liners (.) everything basically you can upholster, I was doing also done cars car trimming and stuff, all sorts of stuff like that

Sammy was also able to use a range of linguistic devices to achieve cohesion between utterances. Grammatical ellipsis was evident on several occasions during conversation, as the italicised extract in the following exchange illustrates:

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INV: it'll all come together, won't it?

SAM: yeah, I'm sure it will [*all come together*] but it's just to keep my patience

Lexical substitution was another form of cohesion that was employed effectively by Sammy. In the extract below, he used *one* as a substitute for *horror* during conversation about movies that he enjoyed watching:

INV: you don't like horrors

SAM: I thought they would watch one it is was (*unintelligible*) but I wouldn't go out of my way to watch one

Pronominal reference too was used to achieve cohesion during Sammy's conversation with the author. Below, Sammy uses the pronoun *it* to refer to his upholstery business:

SAM: I had an upholstery business where I (1:08) refurbished furniture and built furniture

INV: and can you tell me a bit more about that? Did you enjoy it?

SAM: oh yeah, I liked it

Although Sammy displayed several intact pragmatic language skills, his cognitive problems related to his ARBD did cause high-level discourse difficulties. Sammy's retention of verbal information in memory was a significant problem. His immediate recall of the Sam and Fred story was particularly poor, even after it was read aloud to him twice. At the end of the test session, the story was read to him a third time. On this occasion, he was able to recall a few details:

*Sam and Fred:*

"well Sam and his brother (0:87) ah had a farm and ah (1:90) the storm broke out (1:62) and they needed help so (1:71) the local people arrived to give them help to get the animals in the shelter from the (.) whatever (2:28) and (1:74) that's it"

During the Cookie Theft picture description task, Sammy was able to describe the main actions in the scene. However, his description was superficial in nature, omitting all mention of the characters' mental states. The children's behaviour was not described as stealing or deception. It is doubtful that Sammy even grasped the children's deceptive intentions. He overlooked, for example, the young girl's gesture to her brother, warning him to be quiet so that they could avoid detection by their mother. Sammy reported that the sink was 'leaking' but did not account for this in terms of the mother's distracted mental state – she was clearly daydreaming and had forgotten to turn off the tap. The omission of these key mental states suggested that Sammy had a rather limited appreciation of the content of the picture, reflected in his exclusive use of action-based language:

*Cookie Theft:*

"well Sammy's got their hand in the cookie jar for a start (0:76) as they're fallin' off the stool (.) and the other wee girl's trying to grab a cookie (0:99) the other woman's sink's leaking (1:37) she's wringing out a cloth or something it looks like (.) I dunno what's happening outside just looks like a garden (1:90) there's a cup (1:42) there's curtains that's, that's it basically"<sup>1</sup>

That Sammy may have had difficulty with mental state inferences is suggested by his performance on the Cookie Theft task. That he may also have had difficulty with temporal-causal inferences is suggested by his performance on the Flowerpot Incident. Sammy asked the author twice if the pictures in this task were related to each other. It was clear from his account that he could not establish inferences between events in the six pictures. For example, he failed to appreciate that the object on the ground was the smashed flowerpot that had fallen from the balcony in an earlier picture. He misunderstood the scene where the man walked through a doorway with his dog. This was not to take the dog for a walk, but to enter the building so that he could remonstrate with the owner of the apartment. This misinterpretation suggested that he could not see a causal relationship between the picture where the man was struck on the head and the picture where he entered the building – the man entered the building *because* he wanted to lodge a complaint about the injury he sustained in the street:

*Flowerpot Incident:*

SAM: out for a walk with the dog with a walking stick plant falls on his head (1:04) knocks off the hat (2:73) second picture is it meant to be related?

INV: um hum

SAM: obviously they put their hat back on (1:77) ah dog's barkin' (2:09) ah that's about it (1:53) and the other one is don't know what that is (.) where what it's meant to be (0:75) on the ground the third picture is taking the dog through the door (.) for a walk (.) or back into the house (0:91) I don't know (0:81) fourth one is (1:38) hittin' at the door with a stick (1:01) dog beside him he's just come up the stairs (1:09) woman's come out to meet the dog with a bone (2:10) now (.) he kisses her hand in the sixth picture (1:17) and the dog runs away with the bone

As well as omission of temporal-causal inferences, Sammy also failed to draw inferences about the mental states of the characters in this cartoon sequence. No mention is made of the gentleman's anger or that he intends to remonstrate with the owner of the apartment. Sammy did not state that the woman gives the man's dog a bone because she wants to make amends for the injury he has sustained. In the absence of these mental state inferences, the actions of the characters appear to lack motivation and purpose.

Sammy was visited again by the author on 2 February 2020, nearly six months after the first visit. By this stage, the result of his liver ultrasound conducted on 16 August 2019 was known. The scan was unremarkable with no focal liver lesion or evidence of cirrhosis. However, Sammy's ongoing consumption of alcohol since the first visit had had further repercussions for his health. On 13 November 2019 he was admitted to Accident and Emergency. He had a tonic-clonic seizure at home that was witnessed by his brother. Sammy reported to medical staff that he had reduced his intake of alcohol before stopping suddenly. He was kept in hospital for observation. Sammy received intravenous Pabrinex and was started on a reducing course of Librium. He was confabulating during his stay in hospital and had peripheral neuropathy in his right foot. There was no further seizure activity during admission. He was discharged on 15 November 2019 and offered a review by the Alcohol Liaison Nurse which he

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declined as he was already under the supervision of a substance misuse team. Sammy's MoCA scores fluctuated with his drinking. He achieved a score of 26/30 on 20 September 2019, but following discharge from hospital he obtained a score of 21/30 (mild cognitive impairment) on 18 November 2019.

Given Sammy's ongoing difficulties with abstinence, it was decided that a 4-week residence in an Addiction Treatment Unit was warranted. Sammy was admitted to hospital on 5 December 2019 for detox prior to his placement in the unit. He reported to medical staff that he had been drinking daily – mostly Guinness but also shorts such as whiskey – since his discharge from hospital on 15 November 2019. He had 4-5 Guinness the day before admission and was unable to recall his last alcohol-free day. Sammy was again treated with intravenous Pabrinex and a reducing dose of Librium. He was discharged on 9 December 2019 for immediate onward transfer to the Addiction Treatment Unit.

Sammy attended the Addiction Treatment Unit between 9 December 2019 and 20 January 2020. He left the unit and returned home for Christmas. He was re-admitted on 6 January 2020 to complete his course. On admission to the unit on 9 December 2019, his MoCA score was 25/30 (mild cognitive impairment). On 13 December 2019, it was 24/30 (mild cognitive impairment). The Addenbrooke's Cognitive Examination (ACE-III) was conducted on 15 December 2019. Sammy scored 85/100 (mild cognitive impairment), with most deficits in the attention, memory and visuospatial domains. On Sammy's return to the ward on 6 January 2020, his MoCA score was 29/30. A ward drug screen conducted on his return revealed that he had used cocaine and a benzodiazepine, Diazepam 5mg, over the Christmas break. He admitted to the use of both drugs. He risked early discharge from the unit by concealing a mobile phone on the ward. This was only avoided because he handed the phone over voluntarily to staff and there was no adverse impact of his behaviour on other inpatients or on group dynamics as the unit was relatively empty immediately after Christmas. He did not consume alcohol over Christmas. He attributed this to his use of Disulfiram 200mg (Antabuse), a drug used in the treatment of alcohol dependence. By the time Sammy was discharged from the unit on 20 January 2020, his MoCA score was 29/30.

Sammy had not consumed any alcohol for a period of 60 days (8 weeks 4 days) by the time of the author's second visit. Reflecting his improved cognitive status on the MoCA, Sammy performed well on the phonemic (letter) fluency task. His score of 18 words in 60 seconds placed him above normative scores for healthy individuals of similar age, gender and education.<sup>16</sup> This was a significant improvement on his earlier score of 11 words in 60 seconds and suggested some recovery of his executive function skills. However, his semantic (category) fluency score was largely unchanged at 14 words in 60 seconds (15 words on the author's first visit). This score is below normative scores for healthy individuals of similar age, gender and education as Sammy,<sup>16</sup> and suggest that the lexical retrieval and generative capacity tested in this task had not so easily rebounded.

Sammy produced 17 errors during confrontation naming, a slight increase from the 13 errors he committed during the author's first visit. Eight of his 17 naming errors were also errors in the first visit. As before, most of Sammy's naming errors were semantically related to the target word. Sammy used the superordinate term "some sort of insect" for the target word *ant*, before producing *fly*, a word in the same semantic field as the target. Words in the same semantic field were produced for several other target words:

'beetle' → *locust* (semantic field: insect)

'violin' → *base* (semantic field: musical instrument)

'cherry' → *plum; peach* (semantic field: fruit)

'coat' → *cloak* (semantic field: garments)

'French horn' → *saxophone; trombone; trumpet* (semantic field: musical instrument)

'skunk' → *badger* (semantic field: mammal)

'chest of drawers' → *dressing table* (semantic field: furniture)

'duck' → *swan* (semantic field: bird)

'peach' → *apple* (semantic field: fruit)

'rooster' → *turkey* (semantic field: bird)

Sammy eventually named *skunk*, *chest of drawers*, *duck*, *peach* and *rooster* correctly without the use of cuing by the author. Semantic and phonemic cues elicited production of other

target words such as *celery* (phonemic cue), *grasshopper* (phonemic cue), and *pepper* (semantic cue). The semantic cue “it’s dark and red and you find it in cocktails” did not elicit the production of *cherry*, however. The target word *artichoke* was incorrectly named as “pineapple”. This was likely to be a visual error rather than a word from the wrong semantic field. Sammy responded with “don’t know” for both *asparagus* and *potato*, eventually naming *potato* correctly when he looked more closely at the picture. Sammy was also previously unable to name *asparagus* as it did not appear to be a vegetable he knew.

Sammy’s immediate and delayed recall of verbal material was still an area of considerable difficulty, suggesting significant memory problems remained. After a first reading of the Sam and Fred story, Sammy produced the following narrative:

*Sam and Fred: immediate recall after first reading*

“Sam and Fred were brothers who farmed their own land right they had bad weather they had to bring in, it’s basically not a good story to remember”

On this first reading, Sammy recalled only the names of the brothers, the fact that they farmed their own land and that the weather was bad. After a second reading of the story, he recalled two further pieces of information, that the farmers had to get the animals in, and that other people helped them:

*Sam and Fred: immediate recall after second reading*

“Sam and Fred were brothers then they had the bad weather then they had to get the animals in then they had to get people to give them a hand to get the animals in they asked for help and basically that’s about it”

On delayed recall, Sammy did not use the brothers’ names. However, he mentioned for the first time that there was a “big storm”:

*Sam and Fred: delayed recall*

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“The two farmers went to work at their land then there was a big storm and then they went and got some people to ask them to give them a hand to get their animals in and that’s basically it”

Sammy’s memory problems were also having a significant impact on his daily life. He could no longer recall appointments, even regular appointments. He used a diary to aid his memory but often forgot to enter appointments in it. Sammy is taking daily medication. Remembering to take his three daily doses has been challenging for him, even though they are prepared as a pill roll, i.e. pre-prepared sachets of pills for different times of the day. He has put keys and documents in special places for safekeeping but then cannot remember where he put them. In conversation, Sammy does not have any difficulty recalling people’s names or names of objects and places. However, if he has just been told something or if a plan of action is agreed, he will almost instantly forget it without several repetitions.

Sammy’s recall was much stronger when information was also presented to him visually. He watched a short animation of the Little Red Riding Hood story. His narrative was complete and well-structured, quite unlike his narrative for the much shorter Sam and Fred story which is presented auditorily only. Sammy’s superior recall of this story was no doubt also facilitated by the fact that it is a reasonably familiar fictional narrative. He even states this during his narration (see question (3) at chapter end). But not all visual information in pictures was readily understood by Sammy. He was once again unable to identify the broken flowerpot on the pavement during the Flowerpot Incident task. This suggested that Sammy was unable to draw a necessary inference, namely, that the falling flowerpot in one picture became the broken flowerpot in a later picture when it shattered on the ground. Sammy’s failure to identify the broken flowerpot, at least initially, suggests that he was still having difficulty establishing temporal-causal relations between depicted events in a narrative.

#### *Flowerpot Incident:*

“I dunno what that is on the ground haven’t got a clue somebody’s drawing’s not very good”

“I don’t know what that is on the ground, oh it’s the broken plant pot”

Other discourse problems related to Sammy's cognitive difficulties concerned the attribution of mental states to characters in a story or scene. Sammy incorrectly characterized the mental state of the mother in the Cookie Theft picture description task. The sink was not overflowing because the mother was distracted by the children's behaviour. In fact, she was completely unaware of their behaviour *and* the overflowing sink *because* she was daydreaming:

*Cookie Theft:*

"the mother reacts probably as she's overflowing the tap in the kitchen with the distraction that's goin' on"

In the Flowerpot Incident, Sammy was also unable to make sense of the complex mental states that motivated the gentleman to kiss the elderly woman on the hand. First, he explicitly states that he does not know why the gentleman would perform such an action when the woman has just dropped a plant pot on him. Clearly, he kisses her hand as a means of expressing his gratitude to her for the kindness she has shown in giving his dog a bone:

"I don't know, she's only after dropping the plant pot and then he's kissing her on the hand"

Then, he attributes an incorrect intention to the gentleman, namely, that he is seeking to go out for a night with the woman:

"then he kisses on her hand and probably asks her to go out for a night out with him for a bit of craic"

That mental state inferences were still a problem for Sammy on this second visit indicates that any improvement in cognitive skills since the author's first visit has not extended to the domain of social cognition.

## **COMMUNICATIVE PROFILE:**

### *Speech intelligibility:*

- Sammy did not have a motor speech disorder and his speech was fully intelligible; all aspects of speech production and phonology were intact

### *Morphology and syntax:*

- Sammy displayed intact morphology and used a range of inflectional and derivational morphemes; he was able to use and understand utterances with complex syntax

### *Vocabulary and semantics:*

- Lexical-semantic impairments were evident in expressive language; some errors during confrontation naming suggested an effect of education, other errors were visual and semantic in nature; cues facilitated naming; Sammy did not report word-finding difficulties in conversation but did make excessive use of indefinite pronouns and words like 'stuff' and 'thing'; reduced semantic fluency for animal names; Sammy expressed complex conceptual relations in sentences

### *Pragmatics:*

- Sammy was able to use and appreciate humour; laughter was used appropriately in conversation; able to identify when misunderstandings occurred in conversation and moved to correct them; sensitive to his hearer's knowledge and ignorance during conversation; good topic management; normal turn-taking and other skills of conversation management

### *Discourse:*

- Good use of cohesive devices including ellipsis, lexical substitution and pronominal reference; difficulty using mental state inferences and temporal-causal inferences during discourse production; omission of information in discourse related to poor recall of verbal material

### *Cognition:*

- Sammy's performance on the MoCA indicated moderate cognitive impairment improving to mild impairment before discharge from hospital; reduced phonemic fluency (poorer than semantic fluency), suggesting executive function deficits; impaired immediate recall of verbal material; Sammy reported poor concentration and frustration at not being able to concentrate

***Suggestions for further reading:***

(1) Zahr, N.M., Kaufman, K.L. and Harper, C.G. (2011) 'Clinical and pathological features of alcohol-related brain damage', *Nature Reviews. Neurology*, 7: 284-294. doi: 10.1038/nrneurol.2011.42

In this review, the authors examine ARBD from the perspective of WE and KS, two better characterized neurological concomitants of alcoholism. The review addresses the clinical presentations, postmortem brain pathology, in vivo MRI findings, and molecular mechanisms associated with these conditions.

(2) Thomson, A.D., Guerrini, I., Bell, D., Drummond, C., Duka, T., Field, M., Kopelman, M., Lingford-Hughes, A., Smith, I., Wilson, K. and Marshall, E.J. (2012) 'Alcohol-related brain damage: Report from a Medical Council on Alcohol Symposium, June 2010', *Alcohol and Alcoholism*, 47 (2): 84-91.

With short contributions from all eleven authors, this report examines many aspects of ARBD, including the role of thiamine deficiency in WE, cognitive dysfunction in alcoholics, and clinical, neuroimaging and neuropsychological findings in KS.

(3) Royal College of Psychiatrists (2014) *Alcohol and Brain Damage in Adults: With Reference to High-Risk Groups*. London: Author.

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This 90-page report of the Royal College of Psychiatrists in the UK addresses many aspects of ARBD and related syndromes. Readers are referred to the sections on clinical definition and diagnosis of ARBD (pp. 14-21), epidemiology of ARBD (pp. 22-24), and the neurobiological basis of WKS and ARBD (pp. 25-29). The full college report is available online at: [https://www.rcpsych.ac.uk/docs/default-source/improving-care/better-mh-policy/college-reports/college-report-cr185.pdf?sfvrsn=66534d91\\_2](https://www.rcpsych.ac.uk/docs/default-source/improving-care/better-mh-policy/college-reports/college-report-cr185.pdf?sfvrsn=66534d91_2)

### QUESTIONS:

(1) Sammy claimed that he was familiar with the Cinderella story. However, he was unable to tell any part of the story even after using the pictures in a wordless picture book to jog his memory. The author then told the story to him as they both viewed the pictures in the book. Sammy then went on to give the following narrative. Examine this narrative in detail and answer the questions below:

“well she’s out (1:58) with a horse (.) and him (1:37) I feel so stupid so I do now, and ah (3:35) she wants to go to the ball she meets the old woman ends up the fairy godmother (1:09) sh, sh, she turns a pumpkin into a (0:93) a carriage (1:89) takes her to the ball and she has a lovely gets a lovely dress glass shoes (1:17) and she dances with the prince all night (1:45) then she has to be home before twelve (0:77) so (0:88) in her haste to get home she drops a glass slipper (0:79) on the step (1:34) and she gets home (.) and she’s only one slipper on her (1:60) then the prince wants to find out who she is so he sends his courtier out (1:07) look round the (0:84) as a province whatever it’s called and finds her and tries it on her and fits perfectly (1:76) and ah (3:01) then he finds out who she is (1:61) end up (.) they get married and live happily ever after”

(a) Sammy omits considerable information from his narrative. However, the omission is most marked in one part of his narrative. Which part is this?

(b) Sammy shifts the referent of the pronoun *she* at one point in the narrative without signalling this shift of reference. Where does this occur?

(c) The utterance “she drops a glass slipper on the step” is well-formed. However, it falls short of a hearer’s expectation that an utterance should be maximally informative. In what way is this utterance not fully informative?

(d) Sammy uses lexical reiteration as a form of cohesion. Identify where this occurs in his narrative.

(e) What feature of this narrative suggests that Sammy has retained knowledge of the conventional structure of a fictional narrative?

(2) Sammy completed two procedural discourse tasks, namely, how to make a sandwich and how to write a letter to someone. His responses to each of these tasks are shown below:

*Making a sandwich:*

“well you need your bread okay (0:67) you need your butter and cheese and ham you butter the bread depends whether the ham’s sliced or not (.) say it is you put the ham on cut up cheese put it on put the (.) other bit of bread on top buttered (.) and if you like butter that is and (.) cut it in half and eat it”

*Writing a letter:*

“go and get the bit of paper (1:22) sit down and think about what we’re going to write in the letter (0:60) and start off to beginning (0:79) just (1:78) hello (1:06) and (1:53) write a letter an either (.) I just feel (0:76) is this before you post the letter or do this post the letters [INV: *just keep going*] write the letter put it in an envelope (.) put a stamp on it and post it put a name on it”

(a) Are there any sequencing errors in Sammy’s discourse? If so, identify where they occur.

(b) What feature of Sammy’s sandwich-making discourse suggests he is aware that his instructions are conditional in nature and may be subject to change?

(c) Does Sammy check his understanding of task instructions at any point? If so, what does this behaviour reveal about his cognitive and language skills?

(d) What type of cohesive device does Sammy use in the following extract from the sandwich-making discourse?

“depends whether the ham’s sliced or not (.) say it is you put the ham on”

(e) Sammy is clearly adept at describing routine activities like making a sandwich and writing a letter. His procedural discourse is significantly superior to his narrative discourse. Give *three* reasons that might explain why this is the case.

(3) During the author's second visit to Sammy, he watched a short animation of the story of Little Red Riding Hood. Sammy then retold the story. The narrative he produced is shown in full below. Examine it in detail and then answer the questions below:

"Well, Little Red Riding Hood she has her wee cape on her and her wee red hood, and her mother asked her to take her granny over some food of some description, I don't know what it was, so on her way over there she bumps into the wolf, and the wolf asks her where she was going and she says to her grandmother's, so off she skips and the wolf goes a shorter way to get to the grandmother's, knocks the door, puts on a lighter voice, grandmother invites the wolf in, and the wolf eats her up and puts her clothes on and gets into bed, by the time eh the grandmother by the time little miss Riding Hood got there, she knocked the door and the wolf let her in, and she comes into the room and she says "what a big nose you've got", "all the better to smell you with", I think, "what big ears you've got", "all the better to hear you with", I think that was I'm just relying on the nursery rhyme I don't know, "what big teeth you've", "all the better to eat you at", and then he jumped out of the bed and ate her up, and then he got back into bed and started sleeping, then the woodcutter who heard the cries came to the house with his axe, and killed the wolf and out popped the grandmother and Little Red Riding Hood, and so they were safe and then the woodcutter marches off with his axe and the skin of the wolf over his shoulder"

(a) Sammy produced a cohesive narrative. Using examples, identify *two* types of cohesive device that he uses in his narrative.

(b) With *two* exceptions, Sammy makes appropriate lexical selections. Identify the two occasions where Sammy should have made a different lexical selection.



(c) Sammy uses direct and indirect reported speech. Identify *one* example of each type of reported speech in his narrative.

(d) Sammy engages in repair during this narrative. Identify where he undertakes repair. What type of repair strategy have you identified?

(e) Sammy engages in meta-discourse at two points in his narrative. Identify where this occurs. What does the use of meta-discourse reveal about Sammy's cognitive-linguistic skills?

## ANSWERS:

(1)

(a) Sammy omits the entire first half of the narrative. He picks up the story at the point where Cinderella meets the fairy godmother. However, when he gets the story underway at this point, he succeeds in including all main details until the end.

(b) When Sammy states “she turns a pumpkin into a (0:93) a carriage (1:89) takes her to the ball and she has a lovely gets a lovely dress glass shoes”, the first use of the pronoun *she* refers to the fairy godmother while the second use refers to Cinderella. However, this shift of reference is not explicitly signalled by Sammy. A hearer who is unfamiliar with the story of Cinderella would assume that the second use of the pronoun *she* also refers to the fairy godmother.

(c) The utterance is not fully informative because Sammy does not state that Cinderella drops a glass slipper on the step *of the palace*. The omission of this information makes Sammy’s well-formed utterance less informative than a hearer might expect to be the case.

(d) In lexical reiteration, a synonym or near-synonym of a word or phrase is used to link consecutive utterances. Sammy uses lexical reiteration when he varies *glass shoes* with *glass slippers* in the following extract: “she has a lovely gets a lovely dress glass shoes [...] in her haste to get home she drops a glass slipper (0:79) on the step”.

(e) Sammy concludes his narrative by saying that Cinderella and the prince “live happily ever after”. This is a conventional closing sequence to a fictional narrative.

(2)

(a) During his letter-writing discourse, Sammy makes a sequencing error when he states that the addressee’s name is put on the envelope *after* the letter has been posted.

(b) Sammy introduces two qualifications into his sandwich-making discourse: “depends whether the ham’s sliced or not” and “if you like butter that is”. These qualifications describe conditions that may alter the instructions that Sammy is setting out.

(c) During his letter-writing discourse, Sammy asks the author if the task relates only up to the point “before you post the letter”. This suggests that he is able to monitor his verbal output and ensure that his instructions fulfil the examiner’s expectations regarding relevance and informativeness.

(d) Sammy uses grammatical ellipsis in this utterance: “depends whether the ham’s sliced or not (.) say it is [*sliced*]”.

(e) (i) Making a sandwich and writing a letter are well-rehearsed activities. The procedural discourses that capture these activities are likely to activate well-established scripts. These scripts are less likely to be in place for fictional and other narratives; (ii) The procedural discourses for these activities each describe only four or five stages. Even short narratives usually contain more than four or five elements for speakers to recall and then organize into a coherent whole; (iii) Procedural discourses that set out task instructions must capture causal and temporal relations between steps. Temporal-causal relations are only one set of relations that must be represented in narratives. Typically, narratives must also represent the intentional states of characters.

(3)

(a) lexical reiteration (bold) and anaphoric reference (underlining): “grandmother invites the **wolf** in, and the **wolf** eats her up”

(b) Sammy uses *lighter* voice instead of *higher* voice. He also uses *nursery rhyme* instead of *fairy tale*.

(c) direct reported speech: “she comes into the room and she says “what a big nose you’ve got””; indirect reported speech: “the wolf asks her where she was going”

(d) repair: “by the time eh the grandmother by the time little miss Riding Hood got there”; this is self-initiated self-repair

(e) Sammy engages in meta-discourse when he remarks of the food that Red Riding Hood carried to her grandmother “I don’t know what it was”. He uses further meta-discourse when he states: “I think that was, I’m just relying on the nursery rhyme, I don’t know”. The ability to engage in meta-discourse suggests that Sammy can temporarily suspend his discourse and provide commentary on some aspect of it (e.g. his lack of knowledge of the specific foods for the grandmother).

## NOTE

1. It should be noted that the use of a plural possessive determiner (*their*) and plural personal pronoun (*they*) to describe one person is a grammatical feature of Sammy's dialect and is not a sign of grammatical disorder:

"Sammy's got their hand" (*Cookie theft*)

"they're fallin' off" (*Cookie theft*)

"they put their hat back on" (*Flowerpot incident*)

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