

Using Colours and Symbols (CAS)

Researching a new **low-tech AAC**
system for **people with aphasia**

What is aphasia?

Aphasia is a **communication difficulty** often as a result of **stroke**.



What is supported communication?



Using **speech**, **writing** and **drawing** to give **choices** to people with **communication difficulties** like **aphasia**.

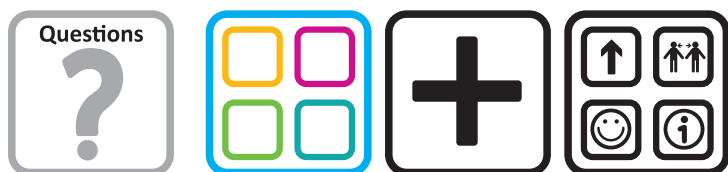


People with **aphasia** are encouraged to **take part** however they can. This might be using:

- **speech**
- **gesture** and **pointing**
- **writing** and **drawing**
- using **pictures**, **maps**, **photos**

Often the **conversation partner** provides the **choices**.

What is Colours and Symbols?



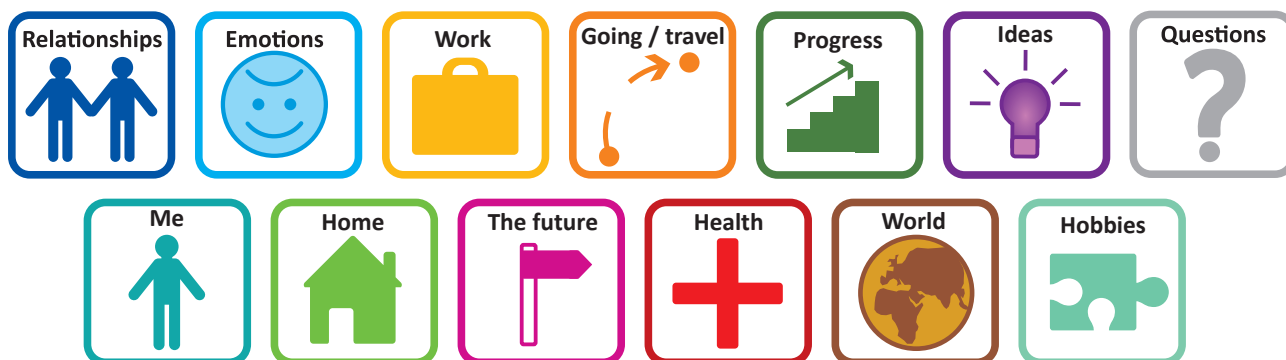
CAS uses **magnetic symbols** and **whiteboards** for **supported communication**.



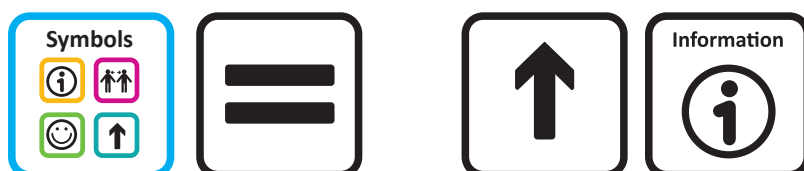
The **person with aphasia** can **choose topics** using **symbols** with:

- **speech**
- **gesture** and **pointing**
- **writing** and **drawing**
- using **pictures, maps, photos**

Topics are **coloured** to make them **easy to find**.

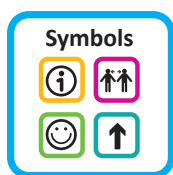


Symbols can be **combined** to give **more information**.



There are **13 coloured topics** and **131 black and white core symbols**.

Background:



Colours and Symbols (CAS) was developed by the researcher in 2014 and has been used with **people with communication difficulties** at NHS WSFT since 2016.

Otto Neurath founded the idea of an **International system of typographic picture education** or '**Isotype**' in 1936¹.

“A simple picture kept in memory is better than any number of complex ones which have gone out of it.”
Neurath (1936).



Research has shown that **people with aphasia** find two-dimensional **graphic images easier to understand** than written or gestural cues².



Linda Worrall et al 2011³ and **Sarah Wallace et al 2016⁴** are **Speech and Language Therapist Researchers in Australia**.



They asked **people with aphasia (PwA)** and their **families** what is **important** to them. They **wanted**:



- to **express** their **opinions**
- to talk about their **ideas, worries**
- talk about **the future** not just the past



- **more information** about their **aphasia, stroke** and local services



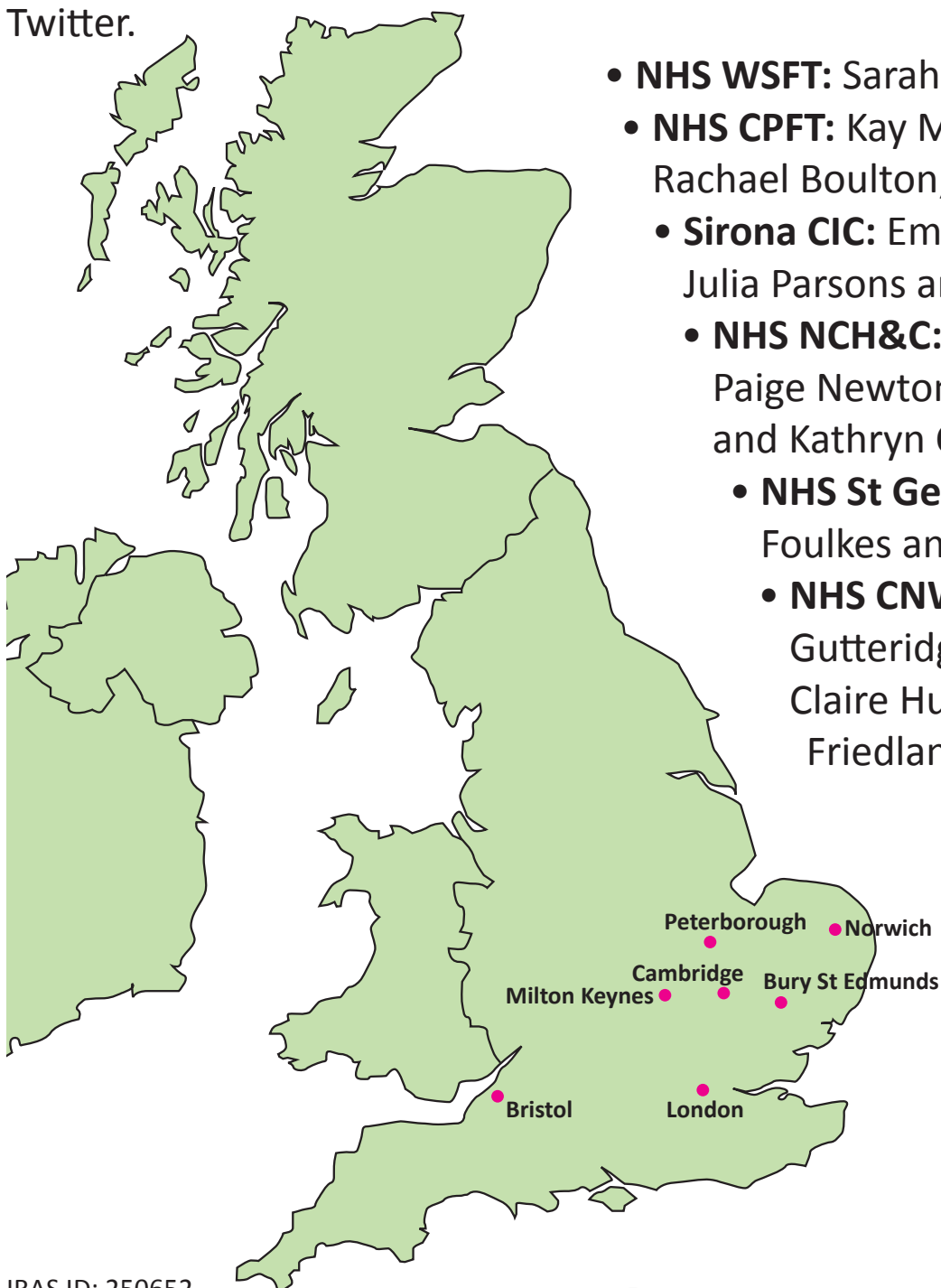
- greater **involvement in decision making**
- **less** communication **breakdowns in conversation**.

Method:

The researcher asked **Speech and Language Therapists (SLTs)** to invite **people with aphasia** who were **receiving therapy** to **participate**.

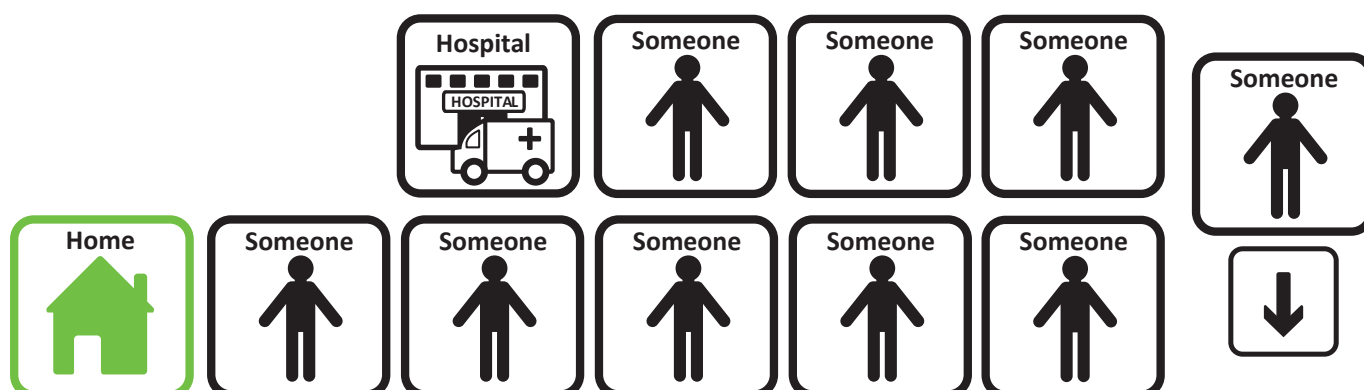


Six SLT teams were recruited via the Royal College of Speech and Language Therapists (RCSLT) research newsletter, word-of-mouth and Twitter.



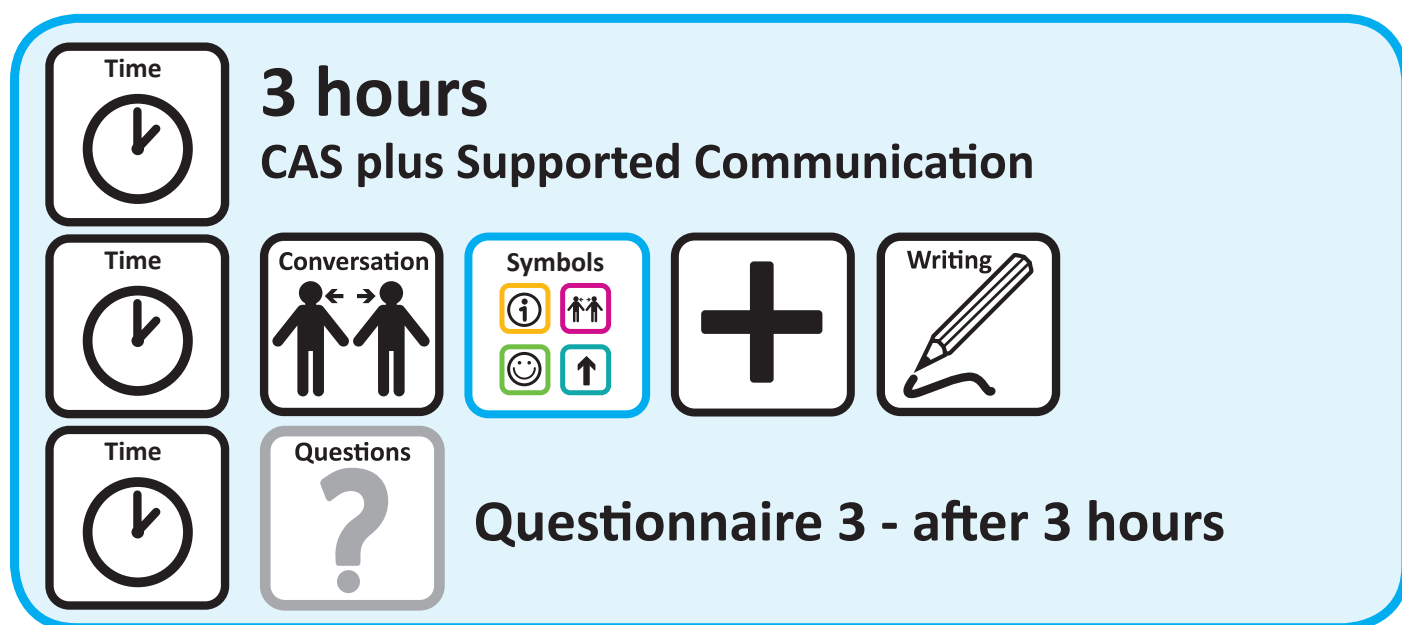
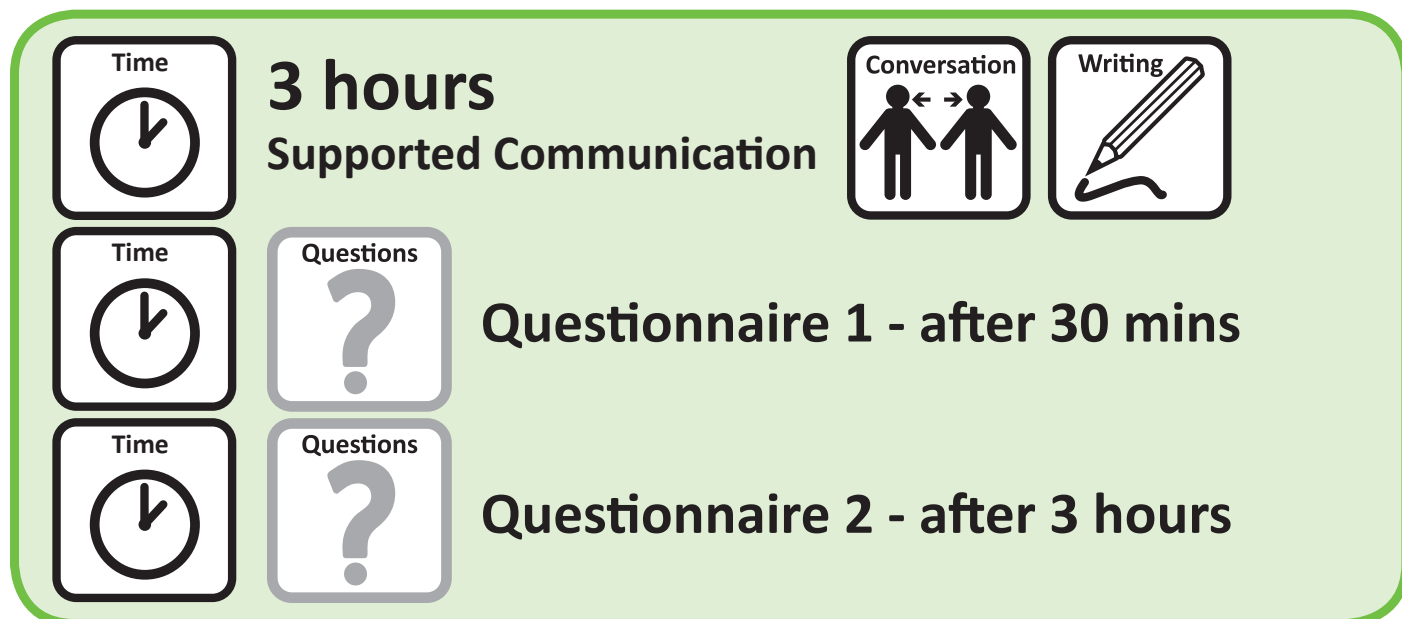
- **NHS WSFT:** Sarah Banfield;
- **NHS CPFT:** Kay Martin and Rachael Boulton;
- **Sirona CIC:** Emma Richards, Julia Parsons and Hannah Austin;
- **NHS NCH&C:** Ginni Brinkley, Paige Newton, Elissa Poyner and Kathryn Clark;
- **NHS St Georges:** Jess Foulkes and Vicky Lack;
- **NHS CNWL:** Katherine Gutteridge, Toria Kilsby, Claire Hunt and Joanna Friedland.

Participants: Nine people with aphasia took part: **four** at home or community clinic, **four** in hospital and **one** went from hospital to home.



	Age	Gender	Time post onset	Stroke territory / Cause of aphasia	SLT diagnosis	Location
PwA 1	67	Male ♂	47 days	Left MCA infarct, thrombolysed, visual difficulties	Moderate receptive aphasia and severe expressive aphasia and apraxia of speech	Hospital
PwA 2	59	Male ♂	2 years	Left MCA infarct	Mild-moderate receptive aphasia, Severe expressive aphasia and apraxia of speech	Community Clinic / Home
PwA 3	67	Female ♀	7 months	Infarct & thrombus Left TACI, Left MCA thrombus,	Expressive aphasia, fluent, jargon, WFD - spoken & written, reduced comprehension following complex information	Home
PwA 4	50	Female ♀	3 years 11 months	Cerebral Meningioma and intracerebral haematoma	Severe receptive and expressive aphasia with improving comprehension but minimal verbal output	Community
PwA 5	80	Male ♂	10 months	Left MCA infarct / ischaemic	Severe expressive aphasia / apraxia of speech, mild receptive aphasia	Home
PwA 6	68	Male ♂	20 days	L PACS	Gestures and single word spoken or written	Hospital to home
PwA 7	51	Male ♂	1 year 4 months	Basal ganglia haemorrhage, large intraparenchymal haematoma	Aphasia: moderate receptive and moderate-severe expressive aphasia	Home
PwA 8	75	Female ♀	7-8 months	Left basal ganglia and thalamic haemorrhage December 2018	Mild receptive aphasia, moderate expressive aphasia	Hospital
PwA 9	49	Female ♀	4 months	Left MCA bleed April 2019	Mild receptive aphasia and moderate expressive aphasia	Hospital

They received **3 hours Supported Communication** then **3 hours CAS plus Supported Communication**.



The **3 hours** were divided into **sessions**, most often **6 x 30 minutes**, the **time between sessions varied from a day to several weeks** depending on the Speech and Language Therapy service.

Questionnaires:

The **people with aphasia** were asked **the same questions** 3 times.
The questions were **scored on a scale: 0** (not good) to **10** (very good).

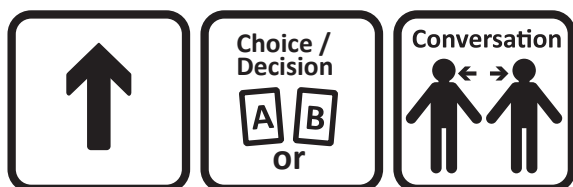


They were asked to **rate** if the **conversation** they'd just had:

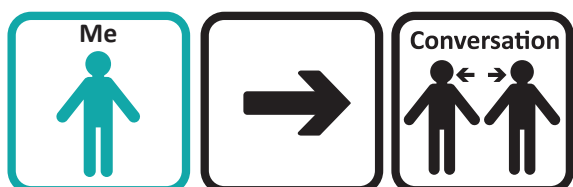
- was **easy to understand**;



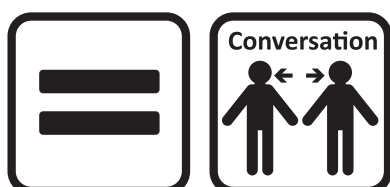
- gave them more **choice in conversation**;



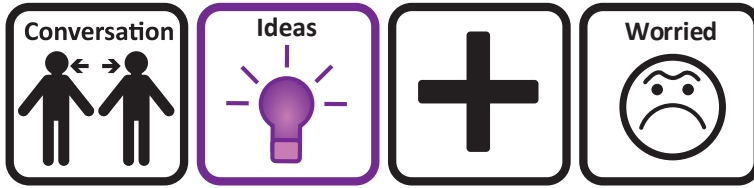
- let them **start conversations**;



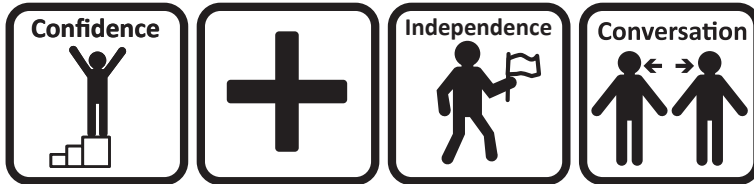
- made them feel **equal in conversations**;



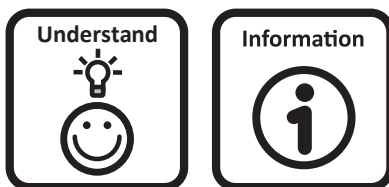
- let them talk about their **ideas and worries**;



- gave them **confidence in conversations**;



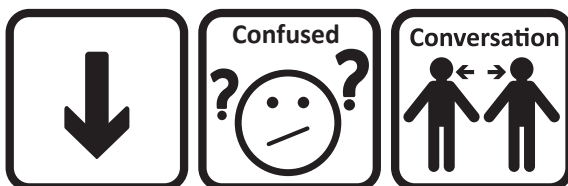
- helped them **understand information**;



- let them **ask questions**;



- **reduced breakdowns in conversation**;



- if they felt **positive about the future**.





Speech and Language Therapist Questionnaire - after 6 hours

The **Speech and Language Therapist** teams were also **asked questions**.

- **NHS WSFT:** Sarah Banfield and team;
- **NHS CPFT:** Kay Martin and Rachael Boulton;
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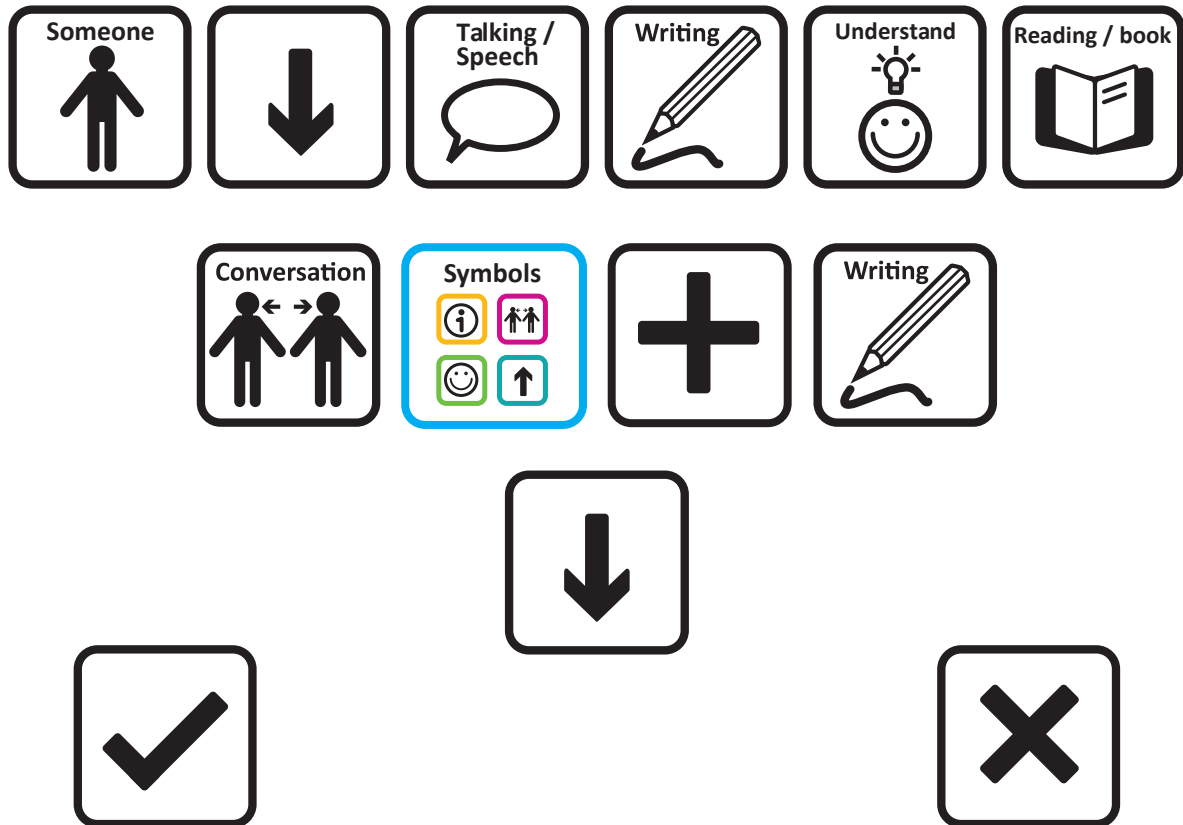
Delivery key facts:

- The number of **clinicians involved in sessions varied** between 1-5 different people including SLTAs and rehabilitation assistants (the greater number in ESD and acute settings)
- There was **variability in the time spent** using supported conversation and CAS. Some clinicians focused solely on supported conversation for 30 minutes per session whereas for others this was combined with other therapy for longer sessions e.g. an hour.
- Length of **time between sessions** varied from **1 day to several weeks** depending on service and patient availability e.g. underlying health issues. Some sessions were combined e.g. 2 in 1 x 1 hour.
- Whether **CAS tool was left with participant between sessions** was left to **discretion of therapist** e.g. if they were finding it an effective method to communicate with care givers it was inappropriate to remove this between Speech Therapy sessions, however will have influenced length of exposure and familiarity for some people.

Although arguably this **variability may affect comparisons between results it is an accurate reflection of current SLT service provision** in different areas.

Results:

Individually people with aphasia had **different opinions** about **what was good about using CAS and what wasn't.**



There was **inconsistency across baselines 1 and 2** for the **majority of people with aphasia** e.g. they **did not rate supported conversation the same** when **asked again** on a separate occasion.

However, the **questionnaires** were asked **independently** of one another e.g. the **person with aphasia did not have access to the previous ratings** provided, which may have contributed to variability.

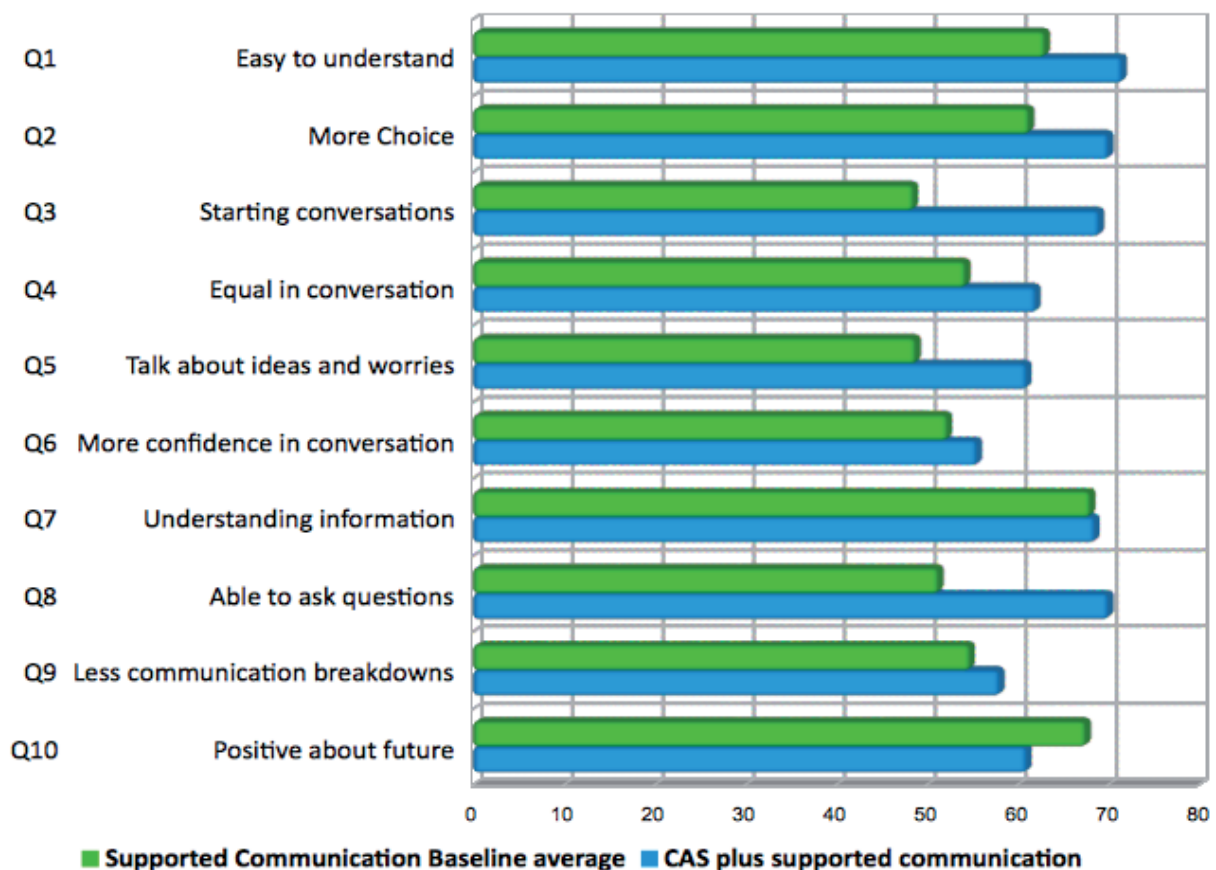
Group results:



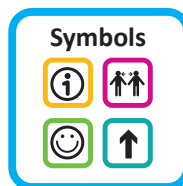
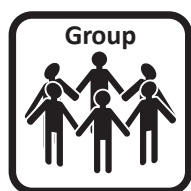
Group analysis: The **limited sample size** was assumed non-parametric so the **Wilcoxon signed rank test** was used.

- There **was not** a statistically **significant difference** between the baselines during the **Supported Communication block** so scores were **averaged**. The value of z is -0.5606. The p-value is .57548. The result is not significant at $p < .05$. The value of W is 22. The critical value for W at $N = 10$ ($p < .05$) is 5. The result is not significant at $p < .05$.
- There **was** a statistically **significant difference between CAS plus Supported Communication vs Supported Communication alone**. The value of z is -2.3953. The p-value is .0164. The result is significant at $p < .05$. The value of W is 4. The critical value for W at $N = 10$ ($p < .05$) is 5. The result is significant at $p < .05$.

People with aphasia group scores
Supported Communication vs CAS plus Supported Communication



- As a group **people with aphasia rated CAS higher** across **all questions except** feeling **positive** about the **future**.



Person with aphasia
and family ***“Thank
you, it was fun.”***

Person with
aphasia ***“I
enjoyed it.”***



Person with aphasia ***“It gives
people with aphasia the ability to
start a conversation they wouldn’t
normally know how to start.”***



Speech and Language Therapist results:

Speech and Language Therapist,
“We have **really enjoyed using the boards** and have **made more** which we **really feel will make a difference to people with aphasia.**”

Speech and Language Therapist, “CAS was **helpful from the first session.**”



Speech and Language Therapist, “The **patient loved using the boards** and felt that he had **more freedom and choice** over what he was able to talk about. He really was **very positive about it.**”

Most Speech and Language Therapists (SLTs) reported increased initiation by people with aphasia using CAS compared to supported conversation alone.

Many participants understood and could combine symbols from the first session using CAS. “The patient *instantly engaged with the board – did not select topics went straight to other symbols and grouped.*”

Although a couple of SLTs reported **less success** “The client I trialled it with **did not really initiate any topics of conversation**, unsure if pre-stroke personality or post-stroke cognitive changes... But it **supported conversations about complex topics.**”

SLTs were key in assisting patients to use the system effectively, “The patient found there to be *too many options* to choose from at times, *used better when presented in sets of categories*. Coloured topic tiles were helpful in doing this.”

Some SLTs identified difficulties with the **time it took** for both them and the patients to **become familiar with the symbols** included and some had suggestions for **additional symbols required**.

For the majority of participants there was **little change observed in verbal output** apart from some spontaneous recovery. However **one participant was able to use the system to self-cue to increase speech output**.

SLTs suggested that **support from family members aids successful implementation**.

Some participants struggled with the **complexity of the questions**. SLTs suggested additional or **alternative questions** could have included:

- Can you have **deeper conversations?**
- **Will you use the symbols?**
- What do you **like about them?**
- **Do other people join in using the symbols with you?**

Suggestions for development included:

- **more portable and compact versions**
- **more positive emotions needed / using emoji to expand options**
- **using CAS to introduce emoji / tech-based symbol systems**

All SLTs could see benefits to using CAS and most were continuing or intending to use it with other people:

*“We have already used this with another client and **I feel that this is an extremely useful resource to have.**”*

*“(I have) used it a lot with people with aphasia who we were unable to consent for study to have discussions re **mood** and **discharge.**”*

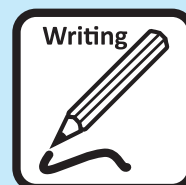
Supported Communication topic examples:

- **Pain** (SLT initiated)
- **Mood** (SLT initiated)
- Places to visit in **Ireland** (PwA initiated)
- **Football** (SLT initiated)
- **Stroke** (SLT initiated)
- **Progress and recovery** (SLT and PwA)
- Return to **work** (SLT and PwA)
- **Family and holidays** (SLT initiated)



CAS plus Supported Communication topic examples:

- Husband's **redundancy** (PwA initiated)
- Getting back to **driving** (PwA initiated)
- **Rugby and Grand National** (PwA initiated)
- **Videofluoroscopy** (PwA initiated)
- **DIY conservatory repairs** (PwA initiated)
- Cremation and burial (PwA initiated)
- **Weekend plans** (PwA initiated)
- Feelings towards **having a carer** (PwA initiated)



Results indicate that there is:

- **CAS** gives **greater control of conversation** to people with aphasia and they **initiate conversation more**
- increased **diversity of topics** using CAS
- **greater complexity and depth of conversations** can occur when people with aphasia are **using CAS**.

Limitations:

- As a pilot study, the **small sample size limits statistical analysis** both **individually** and **by question**.
- **Baseline instability** for **some participants**.
- **Variability in delivery** e.g. duration and length time between sessions, different clinicians involved **limits analysis of optimum delivery**.
- **Varying support** and **carryover from family members** and **carers**.
- **Complexity of the questions** for **people with aphasia** and **lack of objective measures**.
- **SLT and PwA relationship** may have **strengthened** over course of intervention.
- Familiarity with **supported conversation** during first block **may have influenced opinions about CAS** during second block.

Future directions:

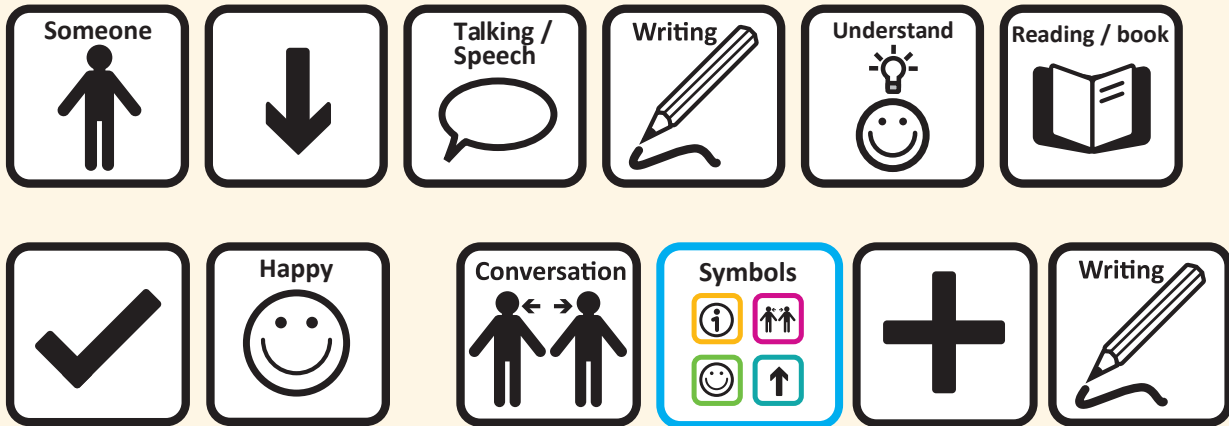
- Research icon clarity and **ease of understanding**.
- More **compact/portable** versions.
- Screening tool to **identify suitable candidates**.
- Trial in **group settings** to see if **CAS can facilitate conversations between PwA**.
- **Feedback from clinicians regarding practical usage** e.g. what do they find it is best for, examples of successful use by PwA.
- Use **memoji** to **personalise** and create **additional symbols identified in research** e.g. more positive emotions, sports, iPad.
- Explore high-tech **emoji/sticker version** or **app**.
- Develop **online videos** and **resources to demonstrate and support delivery**:
 - to communicate **basic needs**,
 - for **goal setting**,
 - introducing and **involving a conversation partner**,
 - using for **supported communication**,
 - using for **complex decision making** and **involvement in health and care decisions**.



Conclusion:

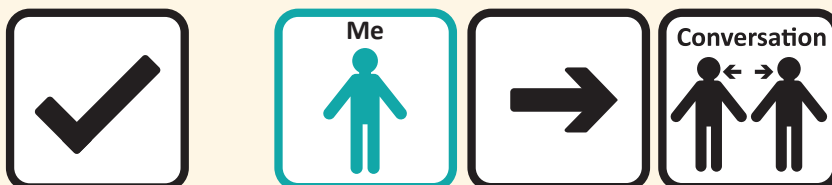


- People with aphasia report that **CAS** is a **useful** and **usable** conversation **tool** to **enhance** supported **communication**.



- People with aphasia expressed that using **CAS** with **Supported Communication** is **preferable** for:

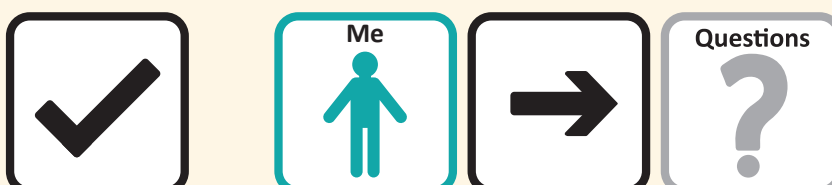
- starting conversations,



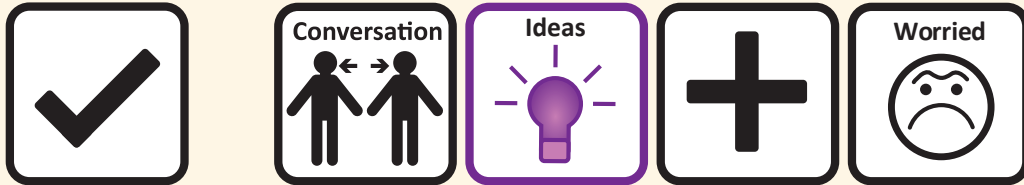
- giving more choice in conversation



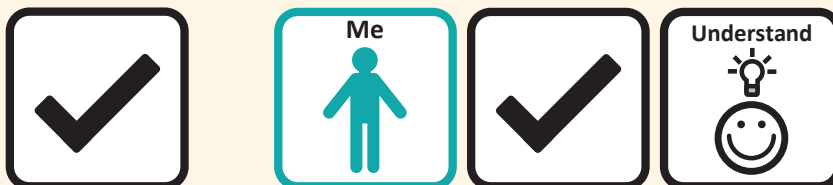
- asking questions,



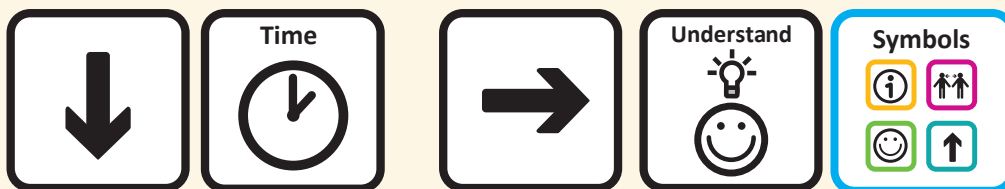
- talking about **ideas** and **worries**, and



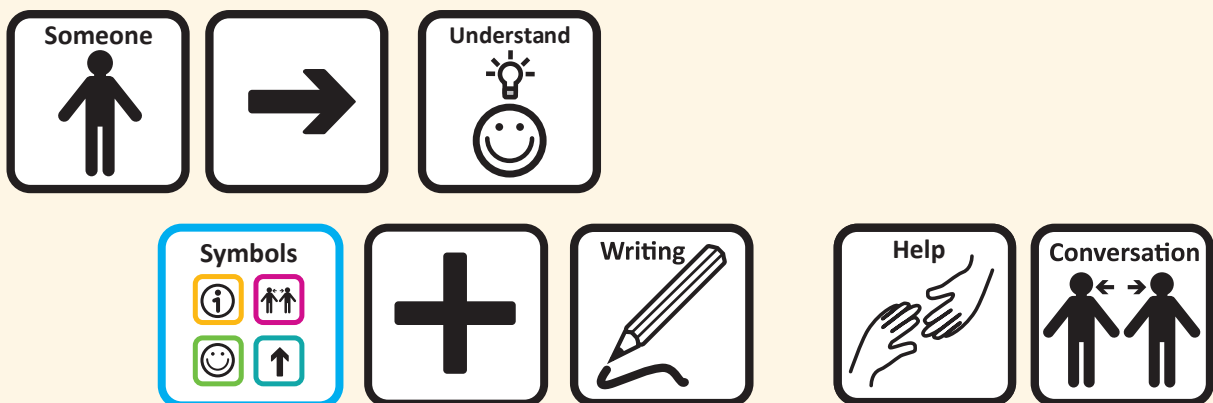
- ease of understanding.



- **Minimal learning** is required to use **CAS**.



- **CAS** works **best** for people who **want to communicate** and **understand** the need for AAC.



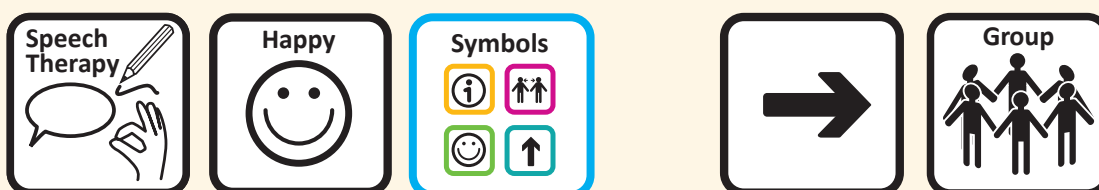
- **Experienced SLTs** are key in deciding how best to **introduce CAS** and **adapt** to meet **individual needs**.



- CAS fits with conventional NHS Speech and Language Therapy service delivery.



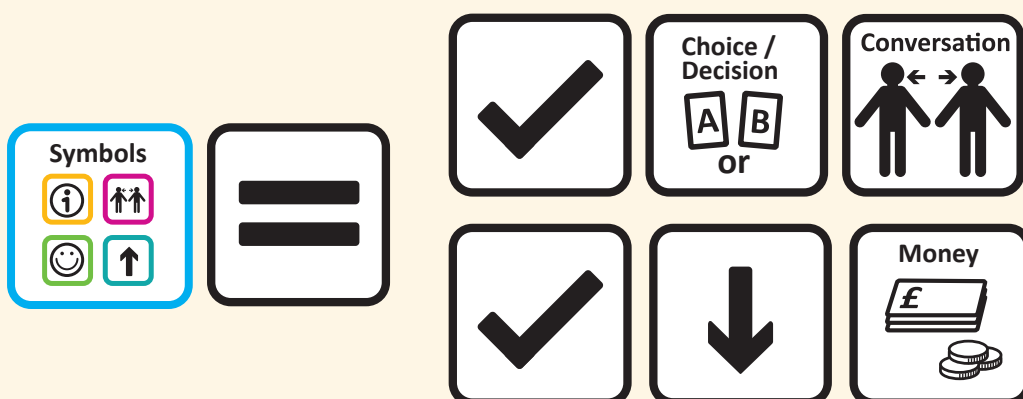
- CAS is a useful tool for conversation partners and Speech and Language Therapists, the majority created extra copies to use with other people with aphasia.



- Supportive conversation partners aid success.



- CAS is a flexible, low-tech, low cost communication tool for people with aphasia.



The symbols can be downloaded **free of charge** at www.cas-aac.org.uk for more information email sarah.banfield@nhs.net

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NHS REC review ethical approval **IRAS ID: 250652**.

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