

Stuart Tactile Maps Test

The Stuart Tactile Maps (STM) test is a non-visual, table-top test of mental mapping skills – a person's ability to learn spatial information to become and stay orientated during mobility. The STM test shows how many times a person needs to practise a route to get it right in theory. The results of this test can be compared with dynamic orientation skills observed during functional orientation and mobility (O&M) assessment.

As well as measuring spatial cognition, the test prompts conversation and insight about strategies that individual people use in learning new routes. This conversation can also identify alternative navigational strategies that can work when mental mapping is too difficult.

The STM test was developed by Dr Ian Stuart, a Melbourne-based neuropsychologist, as part of his doctoral study (Stuart, 1995).

Where Do I Get the Test?

The STM test is not commercially available, but you can make it yourself. The mapping materials are less important than the lines being clearly distinguishable from the background when felt with one finger. The lines need to be continuous around corners, and the relationships between the lines and angles need to be accurate to the original measurements in the standardised task (see page 4: Stuart Tactile Map Dimensions).

There are three options for constructing the maps.

Option 1

The original maps were hand-made from aluminium welding rods (1.6mm) bent into right angle shapes and glued to pieces of Perspex 3mm x 22cm x 30cm. These materials are robust for the purposes of formal research, but the wire/Perspex maps are tricky to make, to get the lines straight and the right angles of the wire accurate as the glue sets.

If you want to try it, use the original dimensions (page 4), and bend a separate piece of welding rod into the shape for each map. Glue each "route" onto a separate sheet of Perspex. The final result needs to have accurate right angles and be free from distracting blobs of glue.

Option 2

The most readily available alternative to the original materials is a set of maps created from blackline masters (pages 5-14) that are copied onto swell paper and run through a thermoform machine. The use of blackline masters helps to standardise map production, but thermoform processes can vary in quality. It is important to check the maps for clean lines with a single finger, eyes closed to ensure there are no additional bumps or textures to distract the participant from feeling the route on each map.

Option 3

If thermoform methods are unavailable, alternative tactile mapping materials can be used such as wiki sticks, slit tape, or a Sewell drawing kit, according to the original dimensions (Figure 1). Each map needs to be firm and stable so that shifting or wrinkling materials don't distract the participant's attention during the standardised presentation of the task.

Three Sets of Maps

There are three sets of maps in the STM test and Set A is the primary set of maps, used in the LoVADA studies (Finger et al., 2016).

Set B provides an alternative to set A to use if you are re-testing a client, but don't want the client to build on what was learned during previous testing. (A person with good spatial cognition might remember these map configurations for months or even years.) The maps in Set B are equivalent in complexity to Set A – they have the same number of lines and angles at each level, but in different configurations.

Set C is the simplest set of maps, focusing on whether the client can recognise basic directions. This set is only used if the client gains a score of 0 on Set A or Set B, suggesting a serious spatial deficit.

Instructions for the Assessor

1. This is a non-visual task. The client wears a blindfold throughout the task, regardless of whether or not she or he has any vision. If a blindfold is not feasible, the client can keep eyes closed for the duration, or a screen can be held between the client's eyes and the map.
2. Seat the client comfortably at a table. Ask which is the client's preferred hand. Sit on whichever side of the client most easily facilitates coactive, hand over hand guided exposure to the maps.
3. Place the first map (A1) in a central position in front of the client with the start spot closest to the client's belly. Don't allow independent or two handed exploration of the maps. This is a standardised, one handed task.
4. Explain that there is a series of maps and that you will guide the client's finger over each map three times then ask him/her to draw the map.
5. Guide the client's index finger (preferred hand) from the start spot on the map to the end of the route three times. While guiding, keep your own guiding hand stable on the client's hand. A wriggling grip can distract from what the client is feeling with the pad of his/her index finger.
6. While guiding each exposure, keep quiet and allow the client to concentrate on the movement and directions of the route. Don't use words like "left" and "right", or count out the stages in the map, or give any clues about the route – you are testing to see how effectively the client works these things out for him/herself.
7. Immediately after three guided exposures, remove the map and place a blank piece of paper centrally in front of the client and give the client a pencil, so that the client can draw what s/he remembers of the route. A4 paper folded in half to A5 is good – this can fit 4 attempts on a sheet, and be unfolded to fit in a file. Remember to label each map with the client's name, the date, which map was being drawn, and the number of each attempt.
8. There are three guided exposures to a map before each attempt to draw a map. If the drawing attempt is accurate, then proceed to the next map in the set. If the drawing attempt is not accurate, provide another three guided exposures and another attempt to draw.
8. The original task allowed for 3 x 3 sets of guided exposures for each map. However, the LoVADA studies indicated it could be worth extending the task to allow up to 5 x 3 guided exposures for each map, that is, five attempts to draw each map.
9. During the test, don't comment on how well or poorly each map was drawn. Just move on the next set of guided exposures. After the test is completed, ask the client about what strategies he/she used to manage the task and discuss outcomes in a way that will benefit the client.

Scoring

The STM test can be scored out of 15, on the basis of up to 5 attempts to draw each map in Set A, using the scoring matrix:

	Attempt 1 After 3 guided exposures	Attempt 2 After 6 guided exposures	Attempt 3 After 9 guided exposures	Attempt 4 After 12 guided exposures	Attempt 5 After 15 guided exposures
Map A1	5	4	3	2	1
Map A2	10	9	8	7	6
Map A3	15	14	13	12	11

Interpretation

The LoVADA studies indicated that people who can draw Map A2 but not Map A3 tend to have limited mental mapping skills and a pervasive risk of becoming lost.

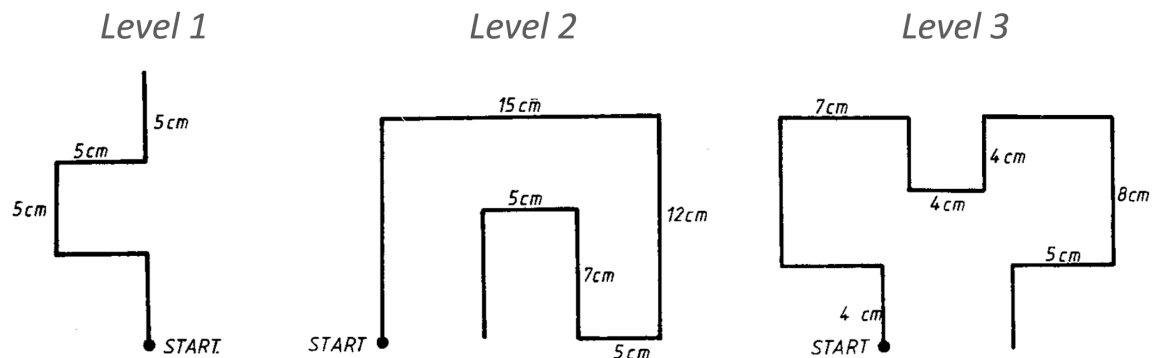
With very low, or no vision they are likely to prefer guided travel beyond home (dog or human guide). People who can draw Map A3 within three attempts use their mental mapping skills to navigate the environment fairly confidently, undertake more independent travel beyond home, and have less concerns about getting lost. If they become disorientated they can usually work it out for themselves.

References

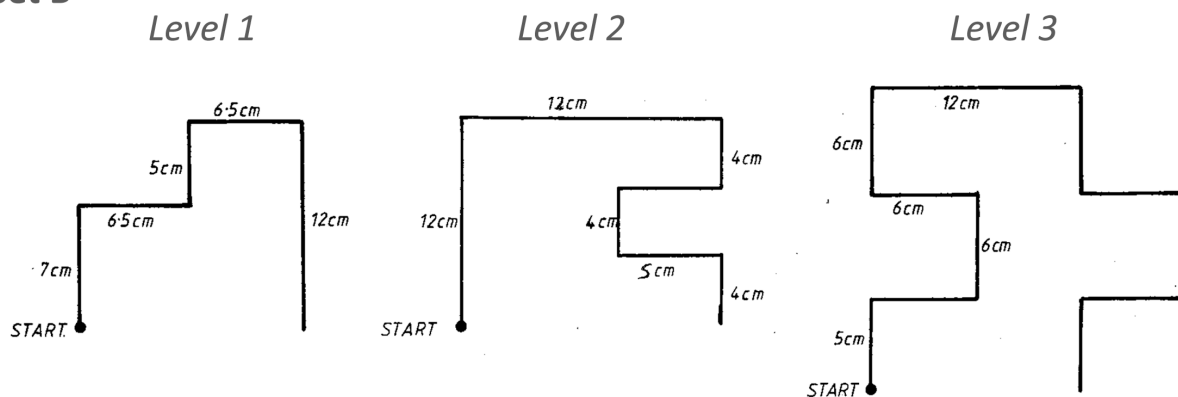
- Finger, R. P., Ayton, L. N., Deverell, L., O'Hare, F., McSweeney, S. C., Chi D. Luu, C. D., ... Bentley, S. A. (2016). Developing a Very Low Vision Orientation & Mobility Test Battery (O&M-VLV). *Optometry and Vision Science*, Accepted for publication 5 March 2016.
- Stuart, I. (1995). Spatial orientation and congenital blindness: A neuropsychological approach. *Journal of Visual Impairment & Blindness*, 89(2): 129-141.

Stuart Tactile Maps Dimensions

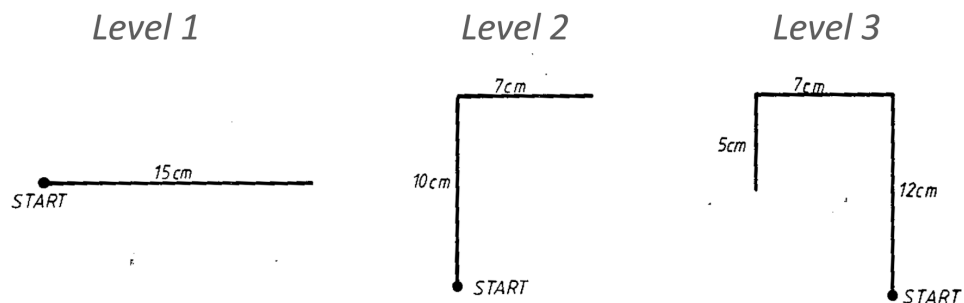
Set A



Set B



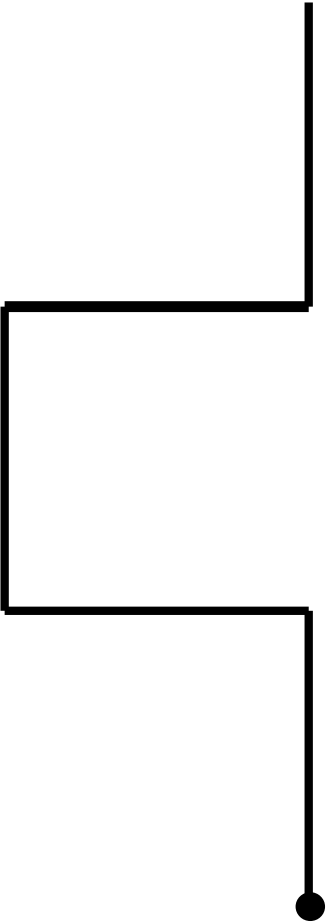
Set C



Stuart Tactile Maps Blackline Masters

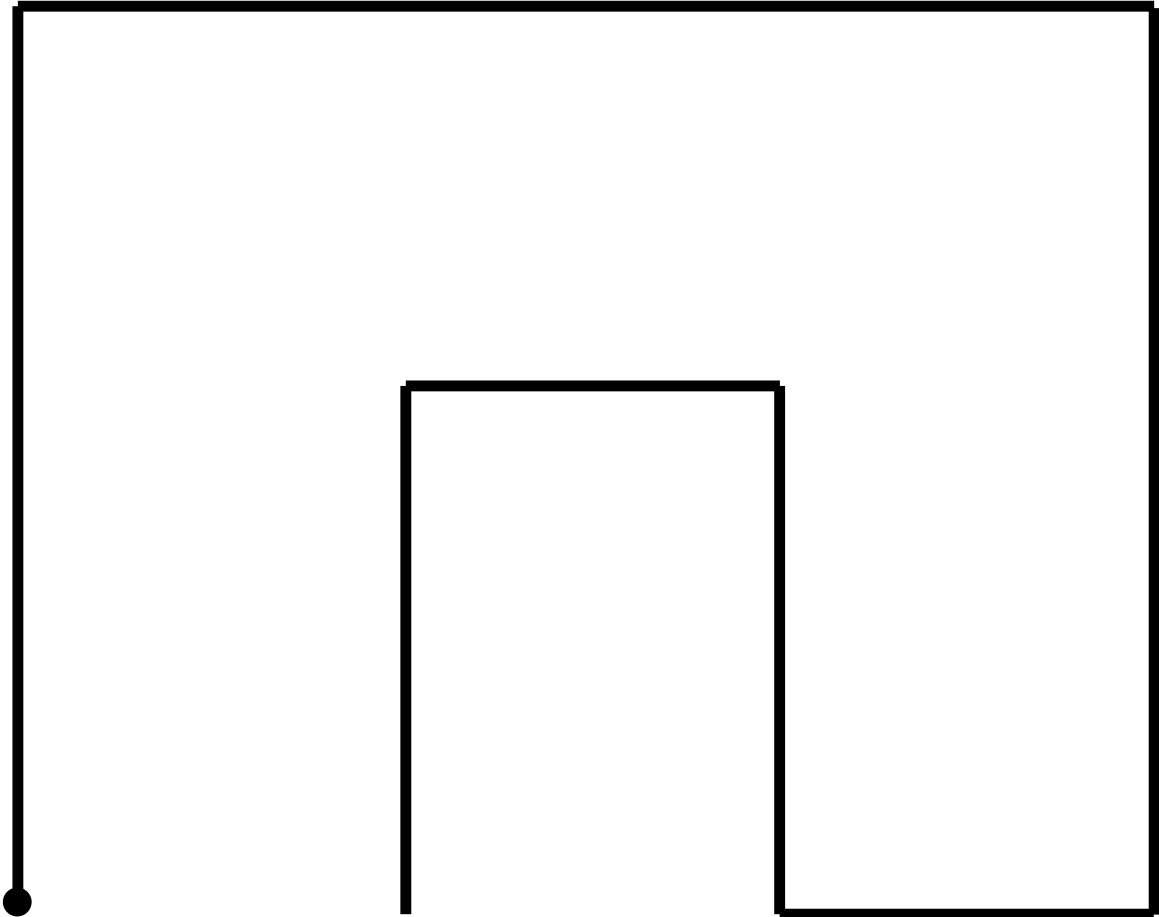
Stuart Tactile Maps

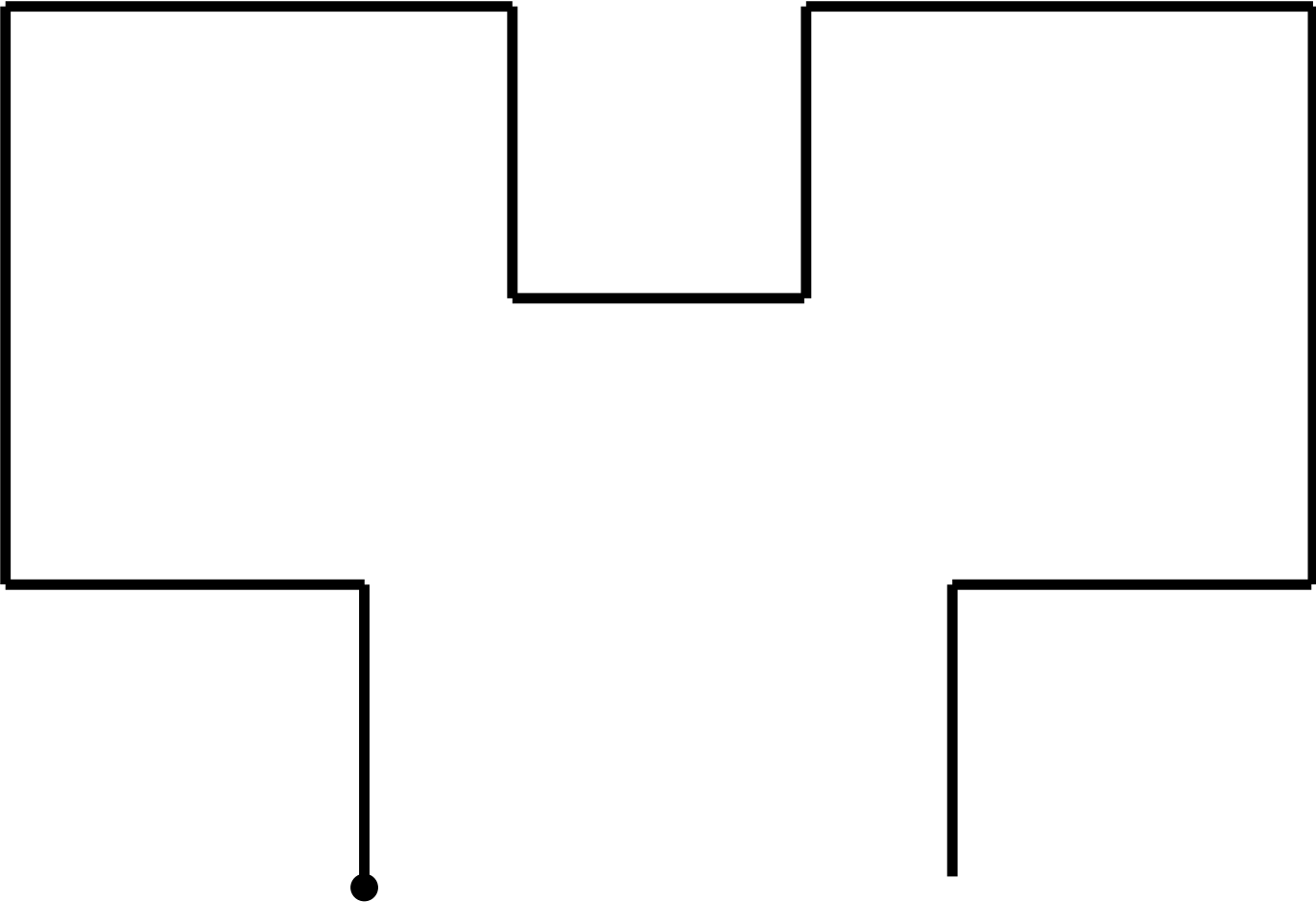
Set A – Level 1

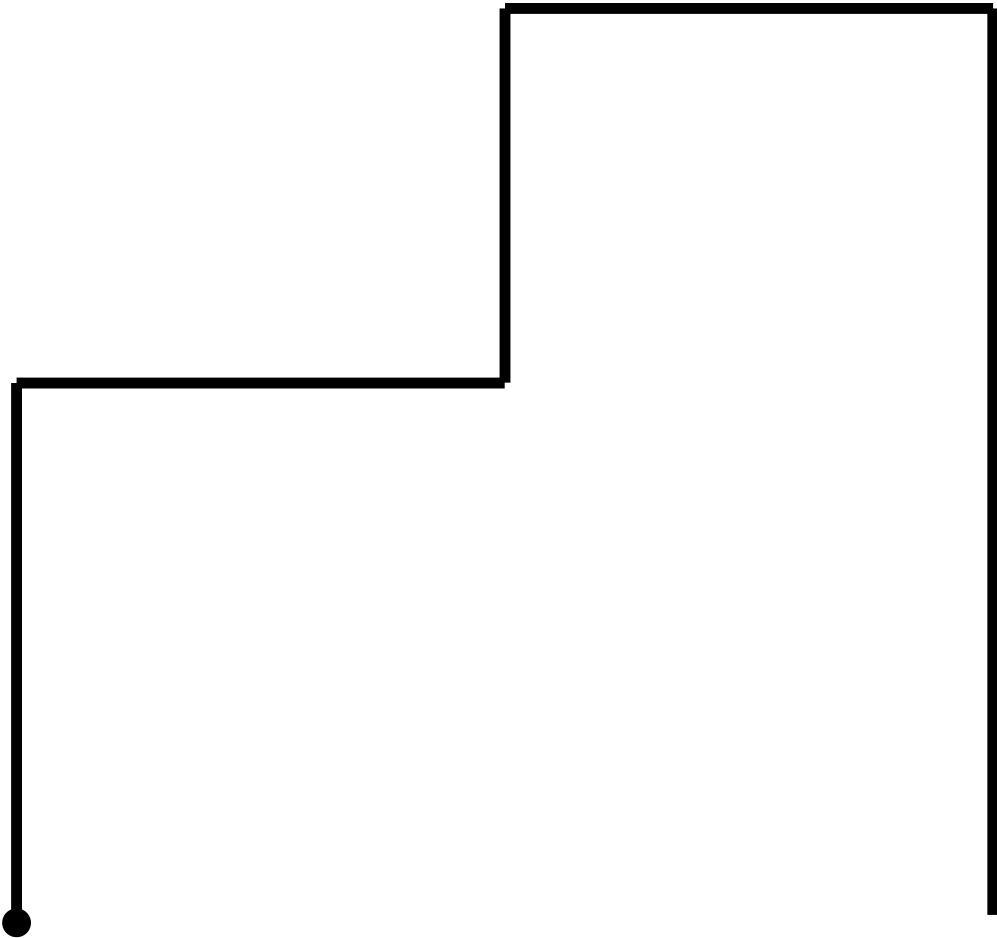


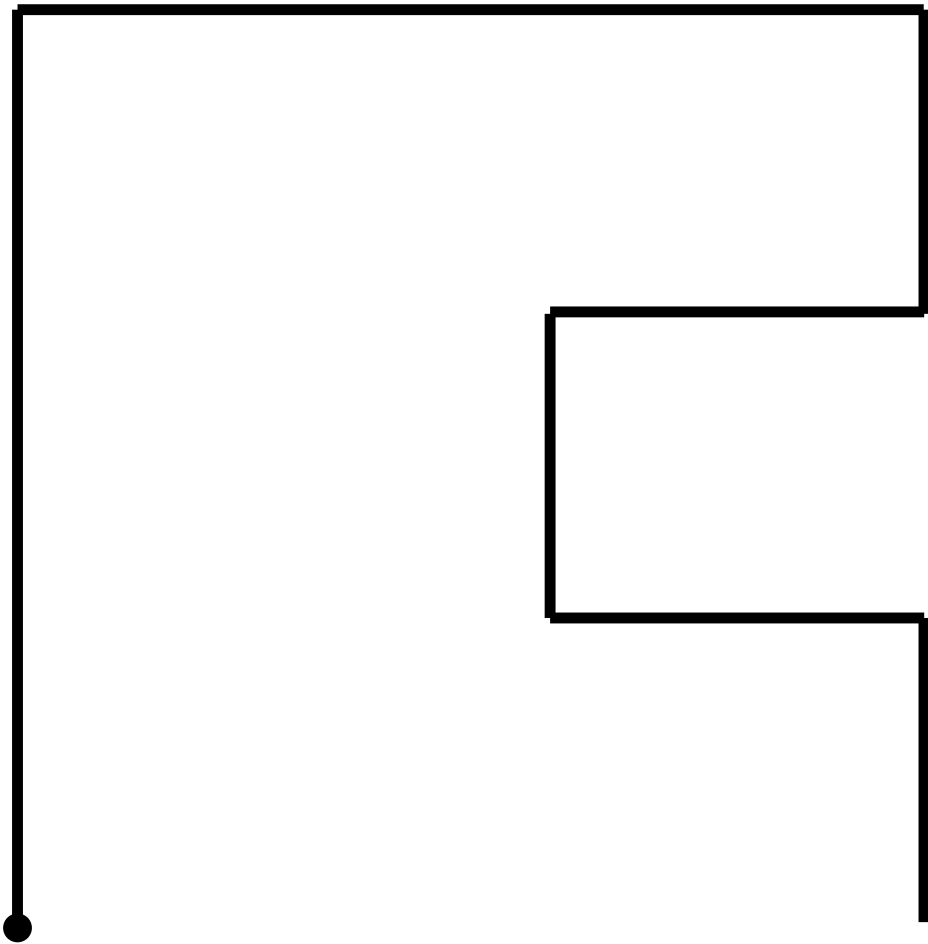
Stuart Tactile Maps

Set A – Level 2



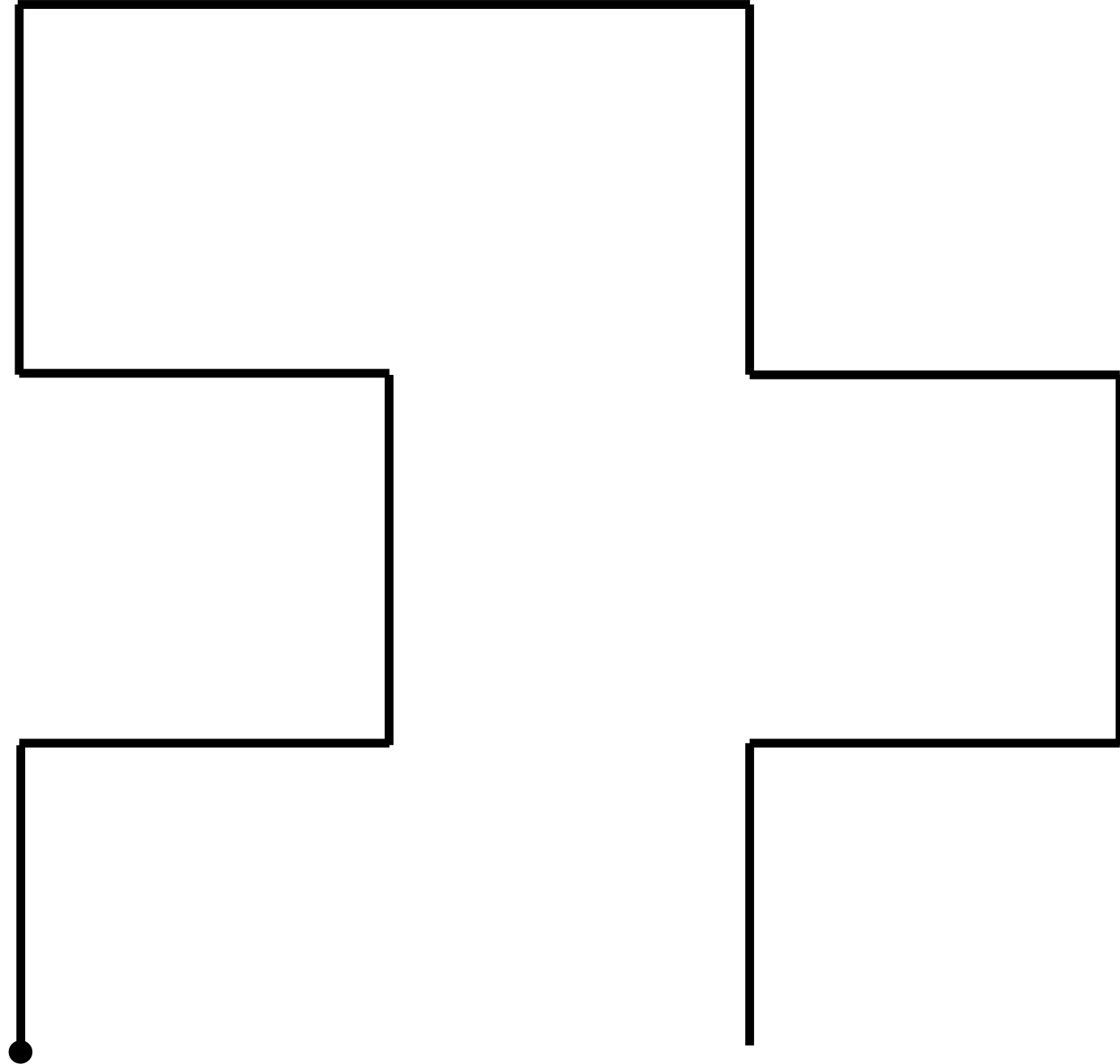






Stuart Tactile Maps

Set B – Level 3



Stuart Tactile Maps

Set C – Level 1



