Cartography M.Sc.

Improving the Cartographic Visualization Techniques of Platial Features

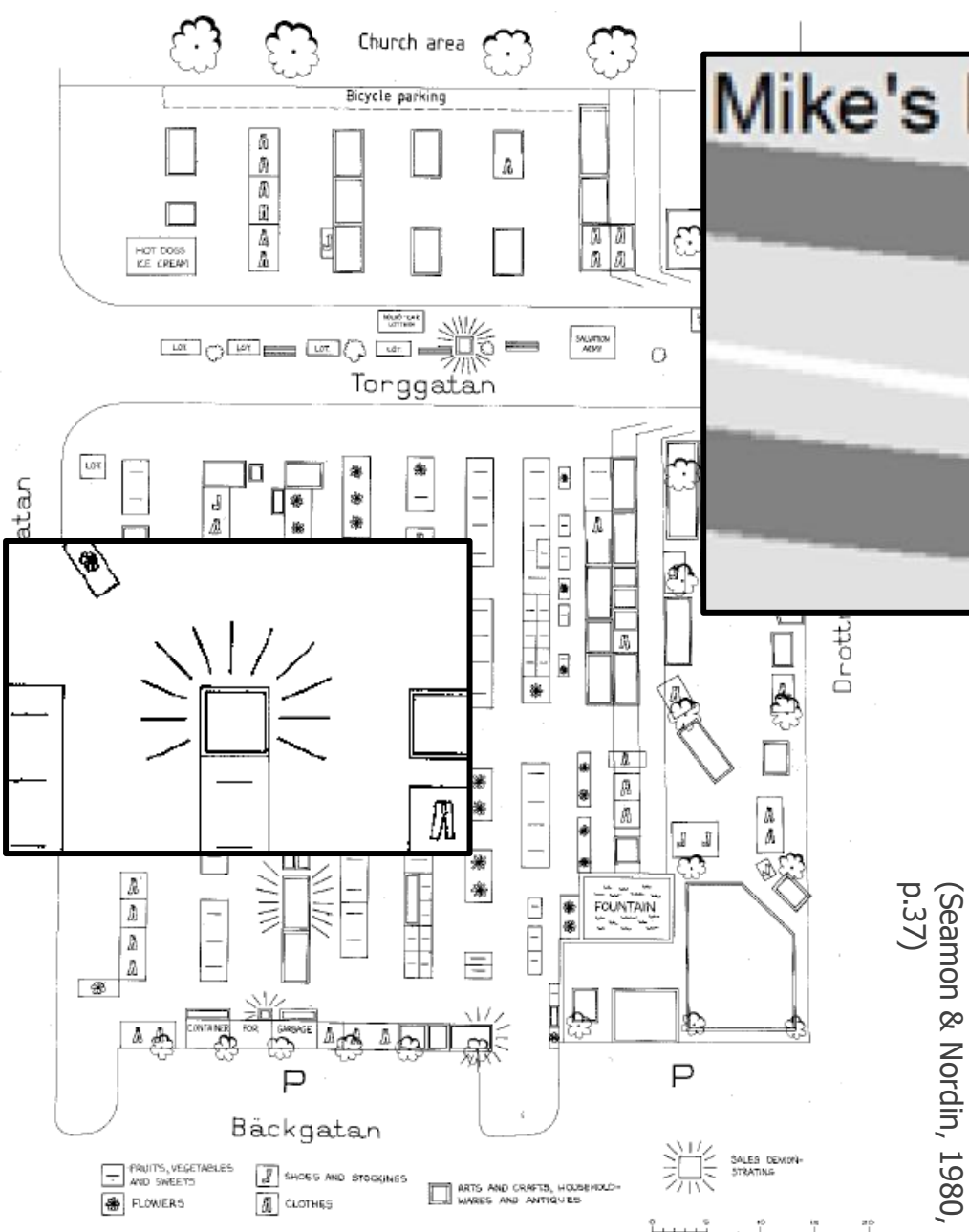
The Example of London Parks

Luke Harvey

Key terms

- Place ≠ space
- A place is a space with meaning (Goodchild & Li, 2011)
- Maps & space
- Place Ballet - the frequent, unintentional convergence of routines in place creating a sense of community (Seamon, 1980)

Motivation



(Seamon & Nordin, 1980, p.37)

(Eck & Pijpers , 2017, p.170)

Research Objectives (ROs)

RO1: To identify the need for conveying platial aspects cartographically to do justice to the geographical concept of place.

RO2: To generate and understand cartographic means to better convey platial aspects

Research Question 1

Which aspects related to place are important and would need to be better visualized?

RQ1A: How does the sense of place change for a park user as they walk along their usual route?

RQ1B: What place ballets can be found in the two parks?

RQ1C: How does the atmosphere of the park change to users within its sub-regions?

RQ1D: How do the affordances of sub regions in the park change for its users?

Research Question 2

Which cartographic means can be employed to provide better visualization of the identified phenomena?

RQ2A: How can a line be styled along a walking route to convey the changing sense of place?

RQ2B: How can place ballets be depicted on a map with maximum detail?

RQ2C: To what extent can the map style communicate the atmospheres of sub-regions?

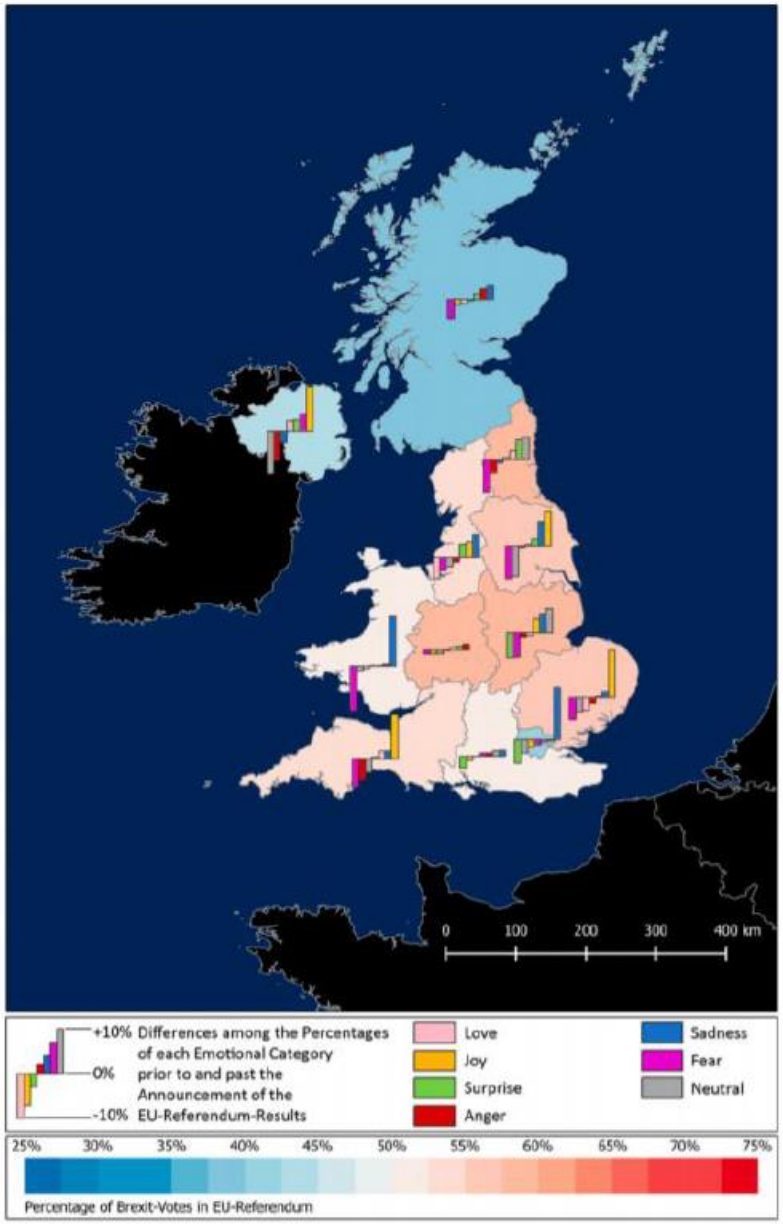
RQ2D: Which visual variables are best suited to convey the affordances of sub-regions in the park?

Research Question 3

- **Do the new visualization techniques better communicate the sense of and identity of a place? Why do they/do they not do this?**

Existing Attempts at visualising platial information

- Charts & graphs
- Different approach
- Northern Ireland & London

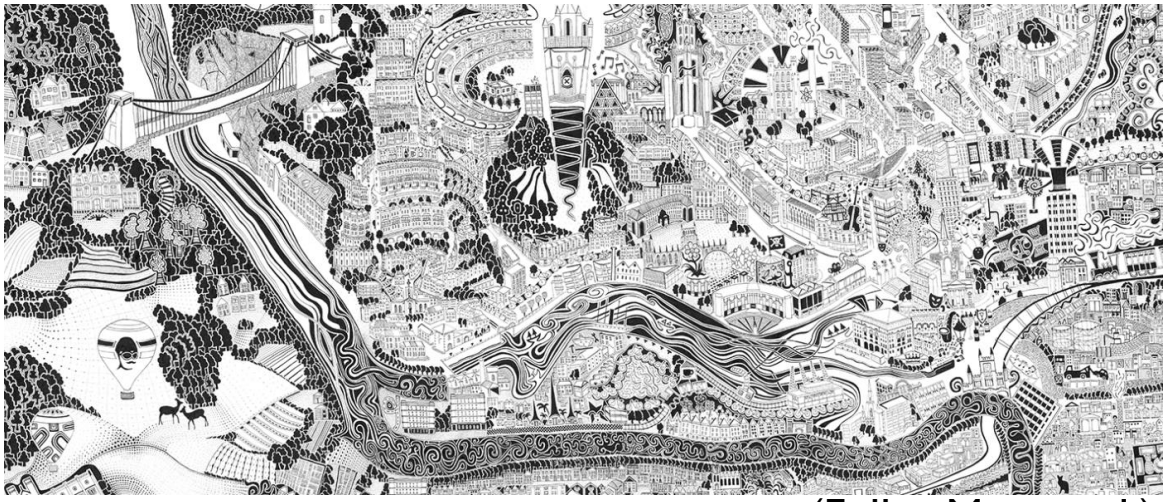


(Hauthal et al, 2019, p16)

Cartography and Art

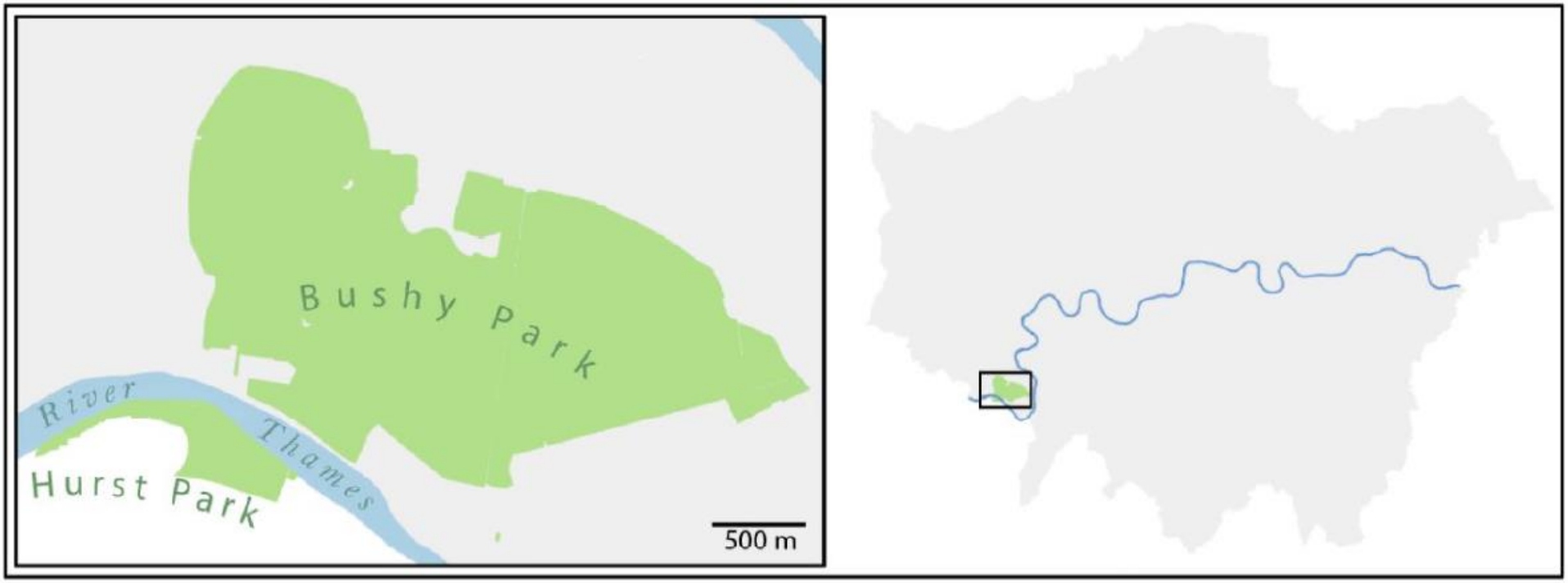
- Growing ties (Cartwright, 2009)
- Cartists (Bogucka, 2019)
- Map Illustration shows places not spaces (Hancock et al, 2018)

(Hunt, n.d.)



(Fuller Maps, n.d.)

Study Sites



Hurst Park (author's own)

Bushy Park (Cuffe, 2017)

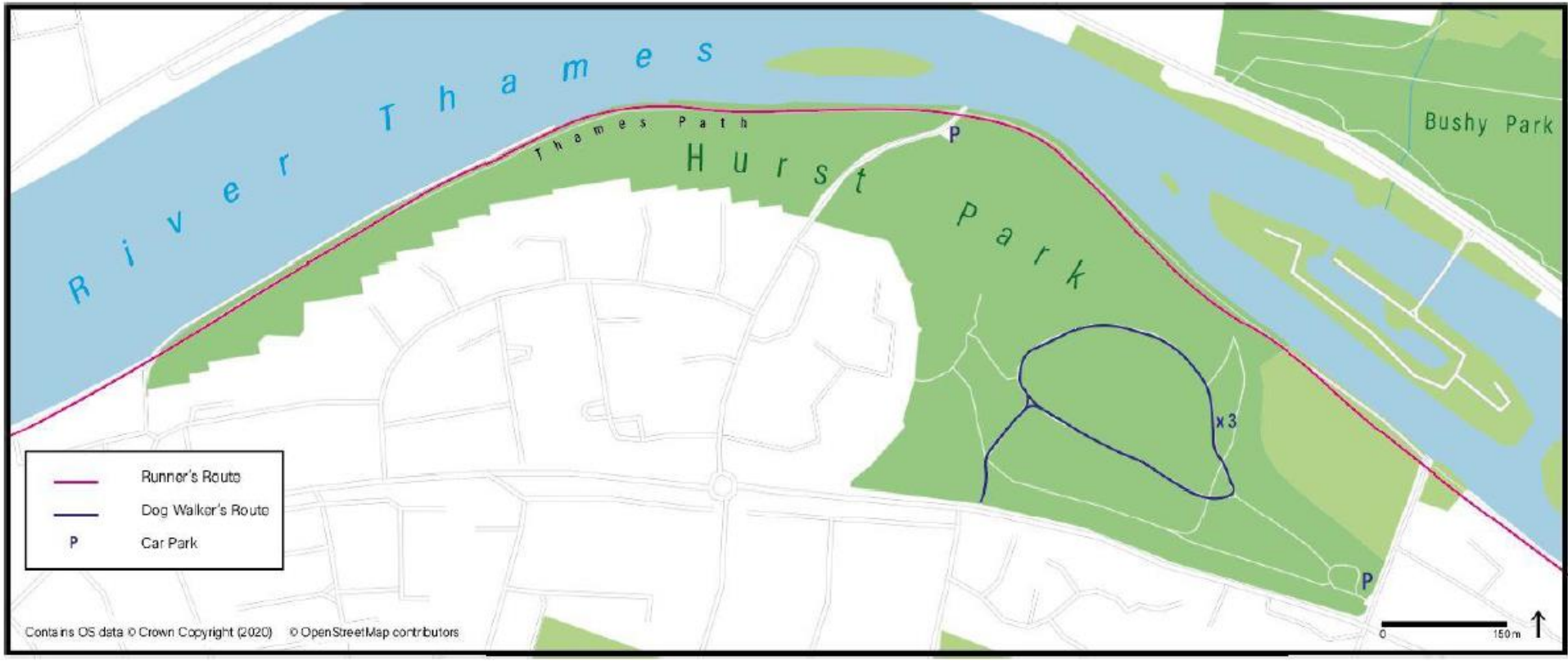
Persona Creation

- Interviews with park users created accurate park personas
- Rich in platial information

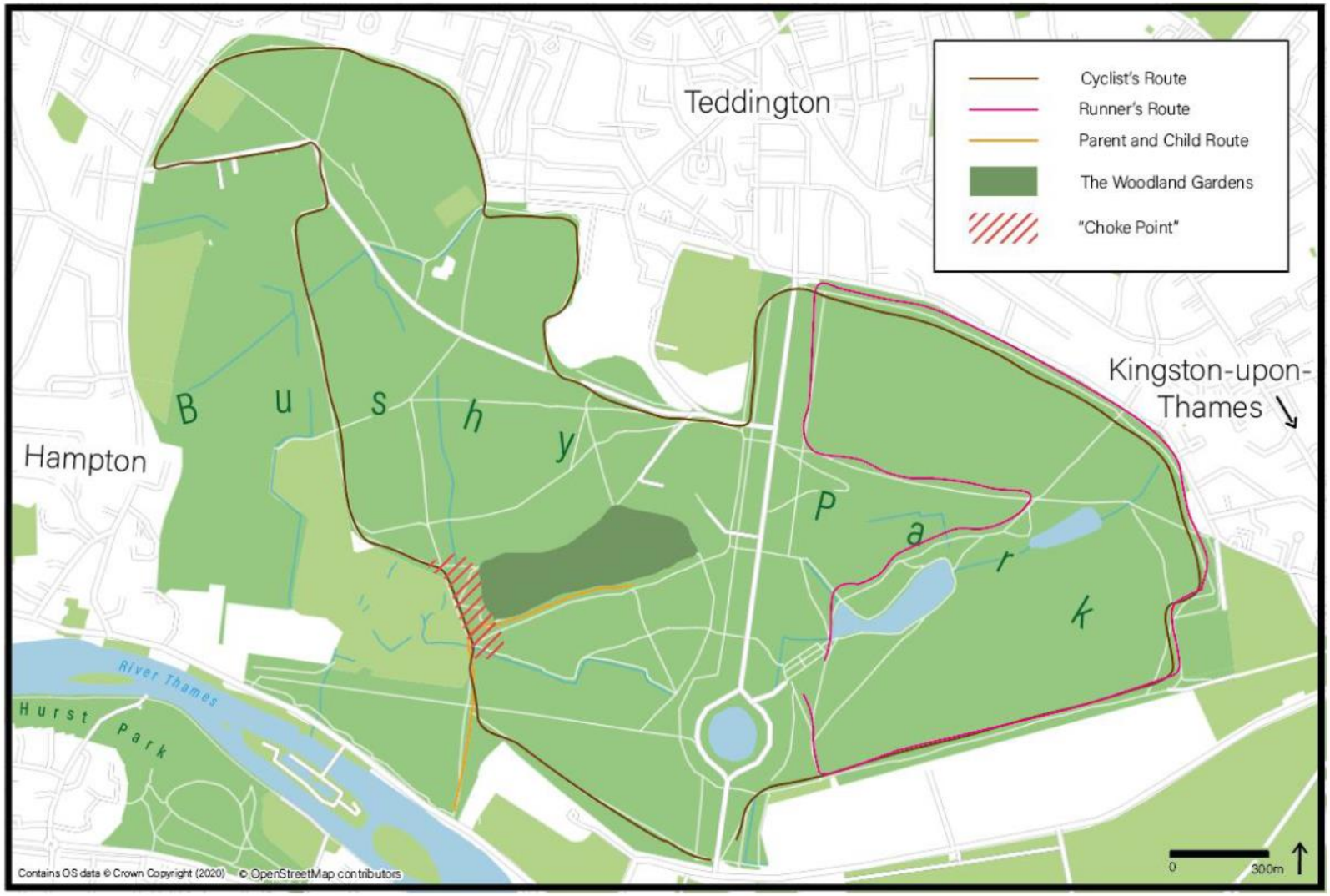
Name	M/F	Age range	Interview Style	Bushy Park	Hurst Park	Predominant Park Use	Visits per week	Place Ballet?
Adam	M	20's	Socially distanced in person	✓		Running	1	Yes
John	M	30's	Video & Audio		✓	Dog Walking	3	Yes
Sue	F	40's	Audio		✓	Dog Walking	4 – 5	Yes
Martin	M	40's	Audio	✓		Running	5	Yes
Louise	F	30's	Video & Audio	✓		Walker with Toddler	3	No
June	F	50's	Audio	✓		Cycling	2 - 3	No
Jackie	F	30's	Audio		✓	Running	3	Yes
Lisa	F	50's	Video & Audio		✓	Dog Walking	7	No
Mary	F	30's	Video & Audio	✓	✓	Walking	1	Yes
Jim	M	40's	Text-Based	✓		Running	6	No

Methods

- 5 Personas created:
- Runner, dog walker, cyclist, parent and child, walker

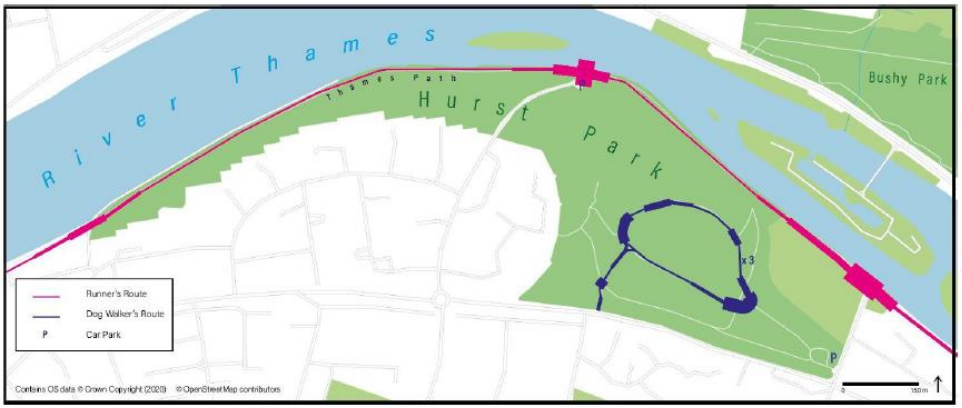


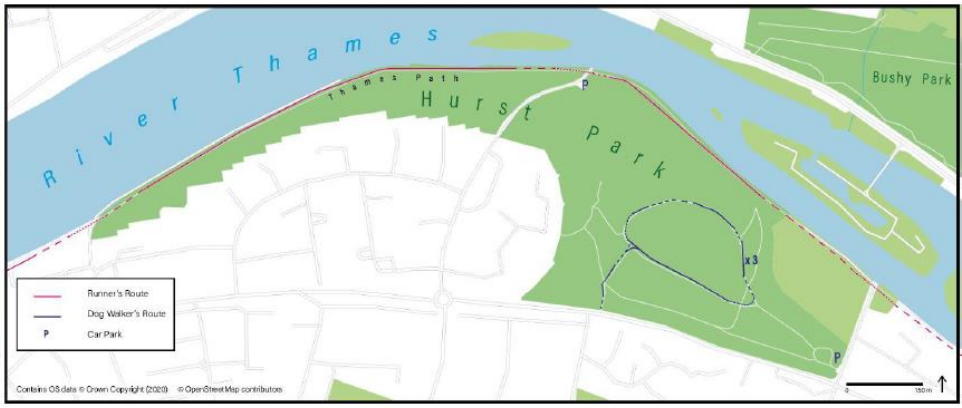
Not an attempt to visualise platial information

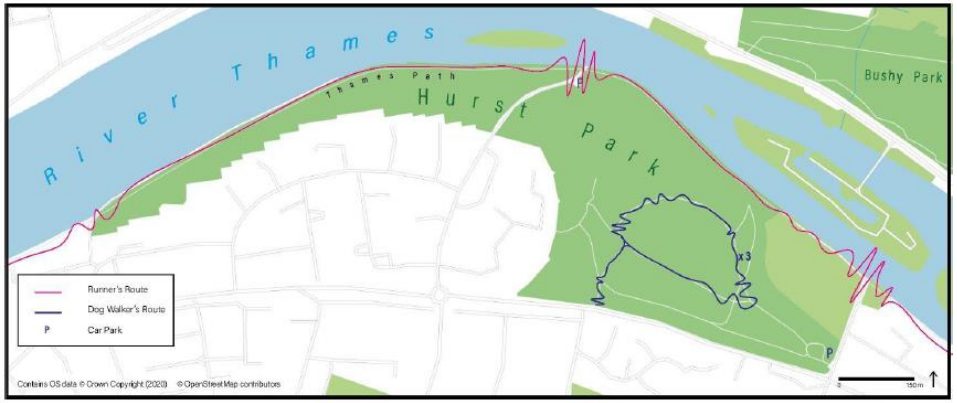


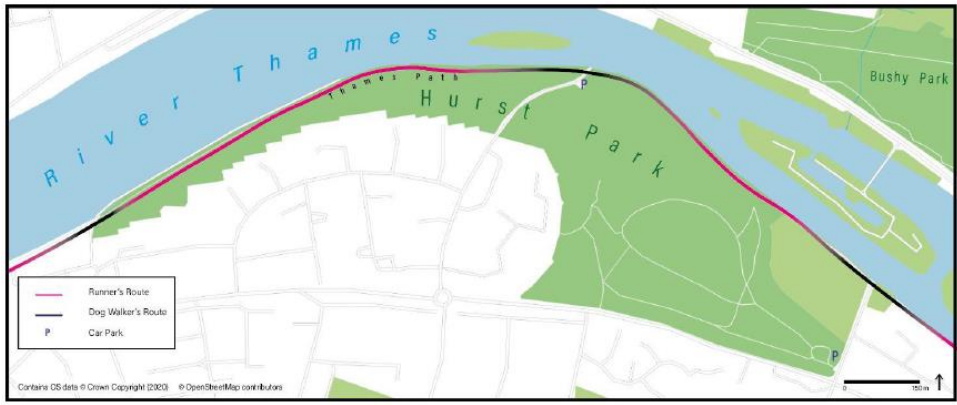
Not an attempt to visualise platial information

Visualization Development



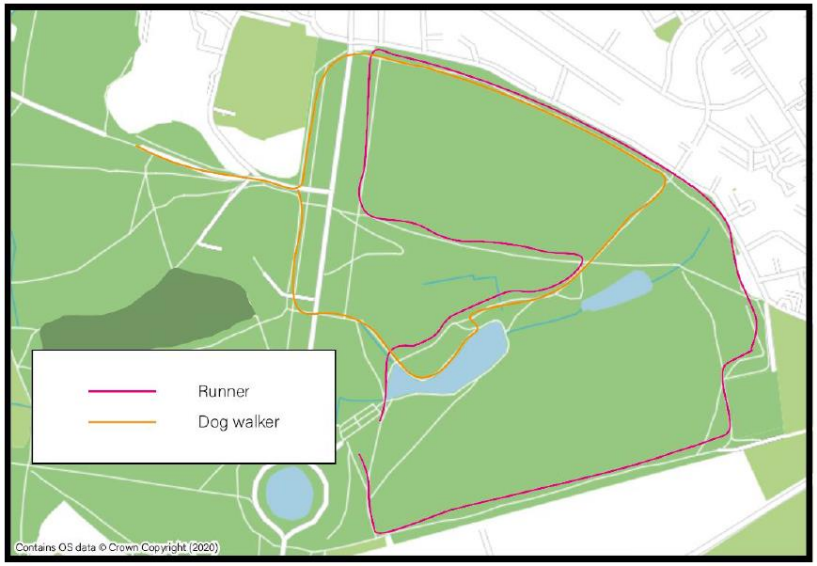


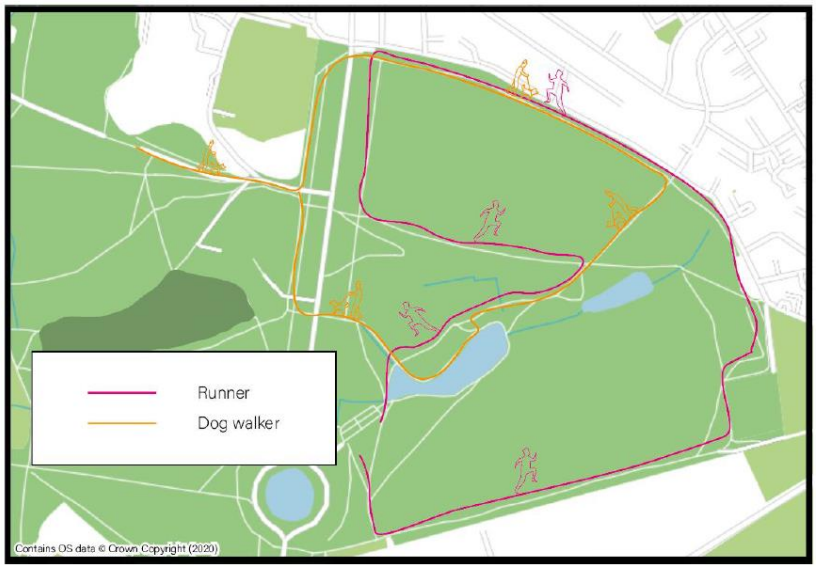


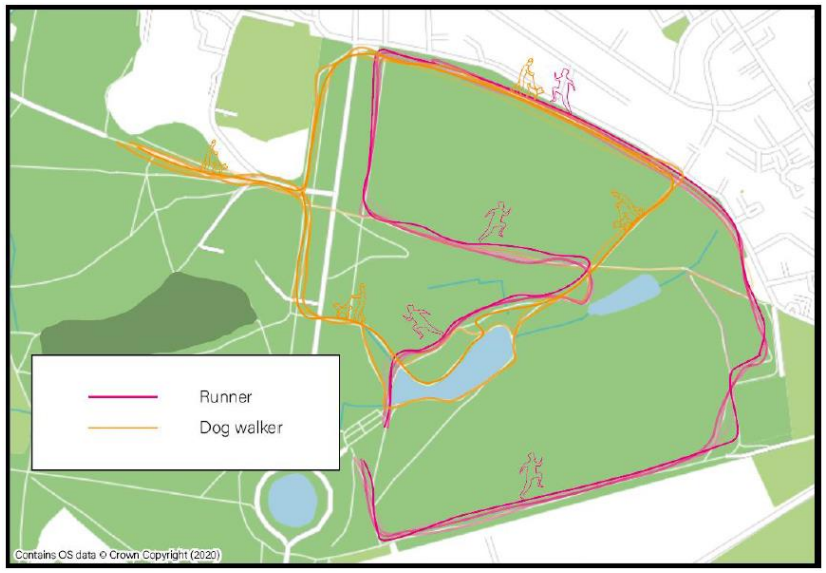


RQ2A: How can a line be styled along a walking route to convey the changing sense of place?

RQ2B: How can place ballets be depicted on a map with maximum detail?

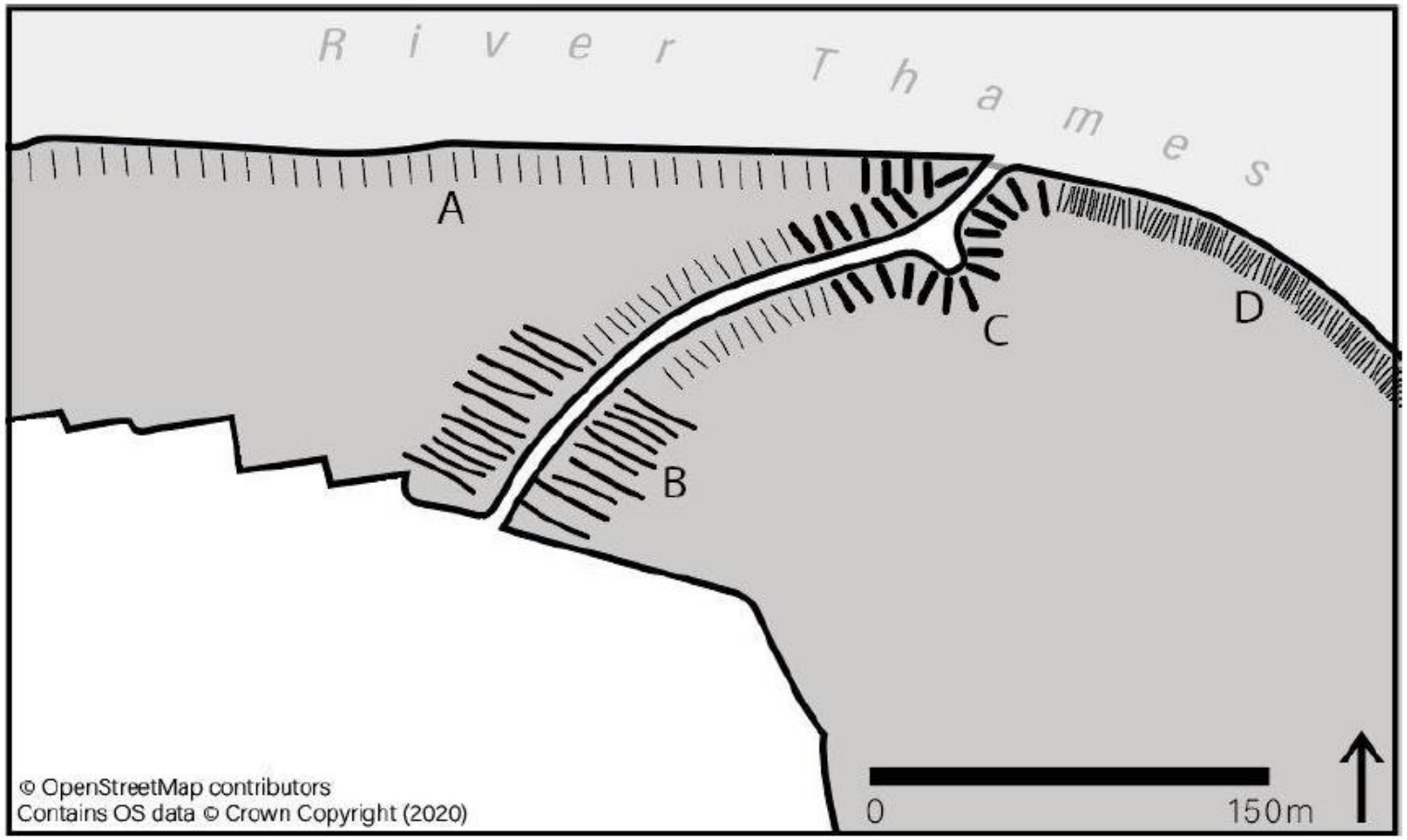






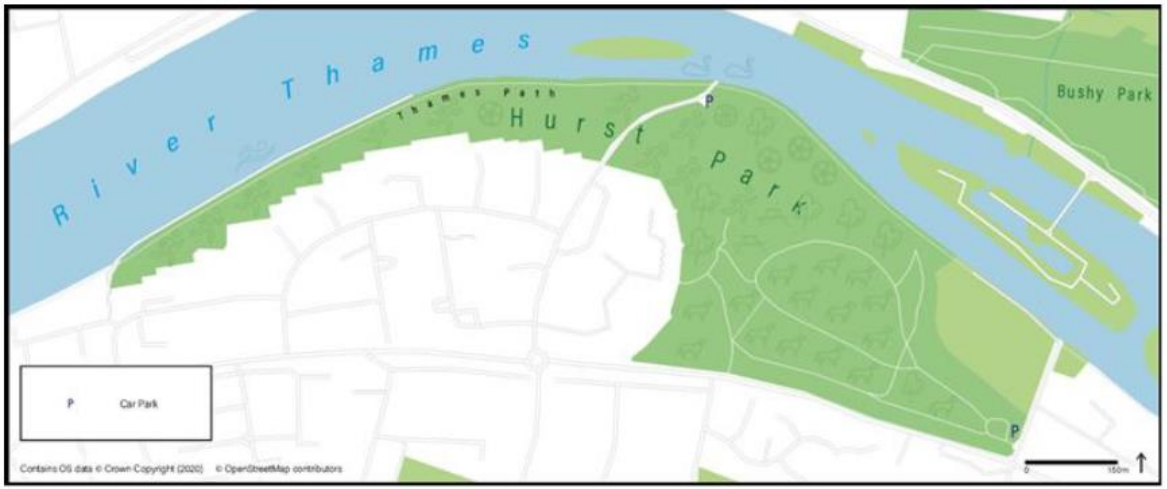
RQ2C: To what extent can the map style communicate the atmospheres of sub-regions?

- Stress as perceived by a the parent with child
- Radiating lines akin to Seamon & Nordin (1980)
- Establish a hierarchy



RQ2D: Which visual variables are best suited to convey the affordances of sub-regions in the park?

- Hand-drawn style (Hotchin, n.d.)
- 6 different affordance icons in Bushy Park; 8 in Hurst Park
- Large areas of continuous dog icons representing the ‘dog walking subregion in Hurst Park’



Online Survey

- 75 respondents

- 5 point Likert scale

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

Line Styling Assessment

For each map, what is the change in line representing?

The persona's…

…stress levels

…rate of acceleration

…speed

Invited to make other suggestions

Place Ballet Assessment

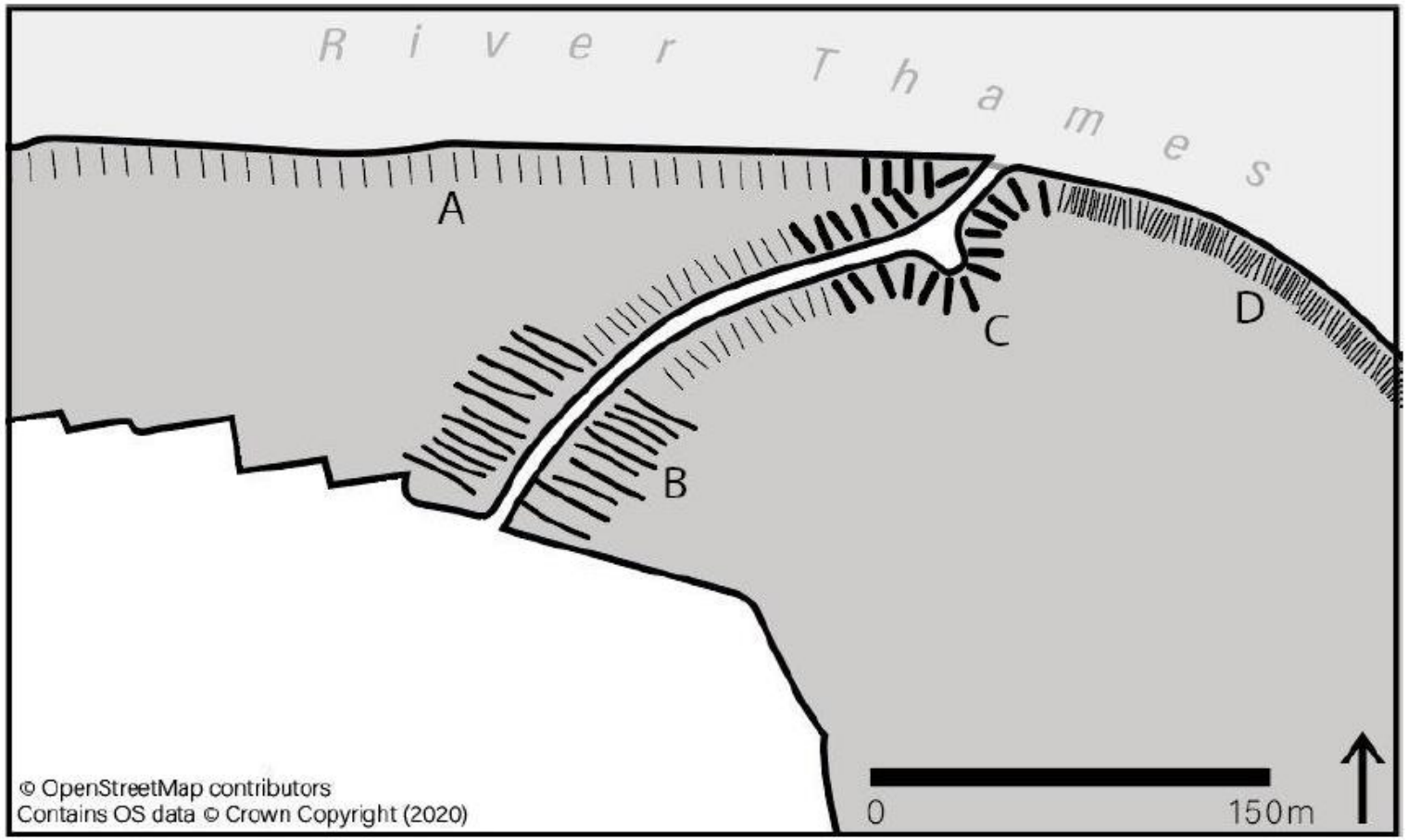
- Respondent's perception for each map.

This map makes me think that the dog walker and the runner...	Place ballet aspect
...are visiting the park at the same time	Temporal
...only took these routes once	Temporal
...interact with each other at only one location along the route	Geographical
...interact with each other at multiple locations on the route	Geographical
...do not interact with each other on their visits	Interactional
...interacted with each other by coincidence	Interactional
...interact with each other on different days in the park	Interactional
...do not know each other	Interactional
...expect to see each other when they visit the park	Interactional

- Asked to plot the location of the place ballet on each map.

Atmosphere of Subregions Assessment

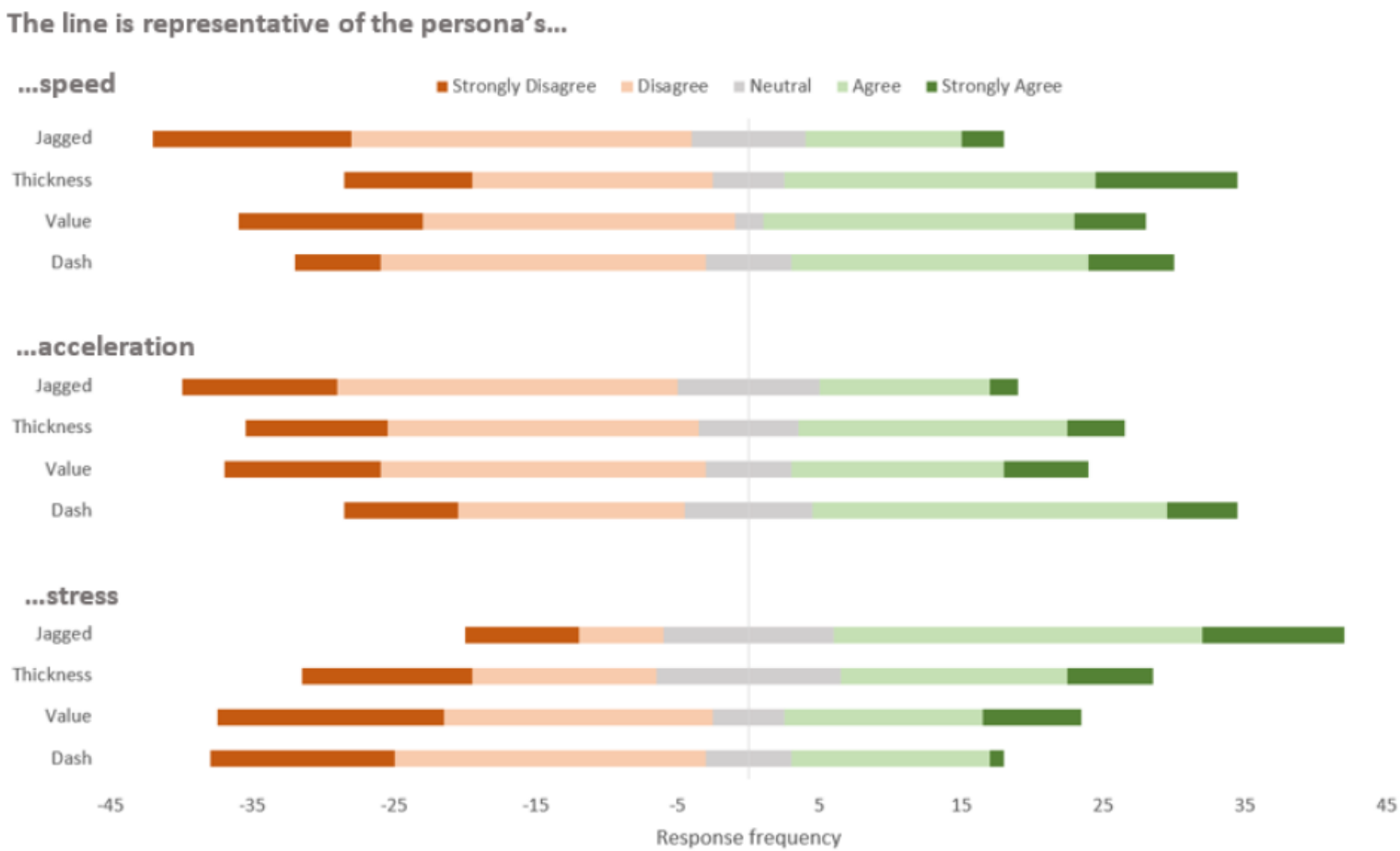
Which line style is indicative of the most stress?



Affordances in Subregions Assessment

1	There is a wider variety of activities in Bushy Park compared to Hurst Park
2	You can play football/soccer anywhere in Hurst Park
3	You can play football/soccer anywhere in Bushy Park
4	Deer roam freely in Bushy Park
5	Dogs are welcome in all sections of Bushy Park
6	Dogs are welcome in all sections of Hurst Park
7	Bushy Park is homogenous in its park use
8	Hurst Park is homogenous in its park use

Results Line styling



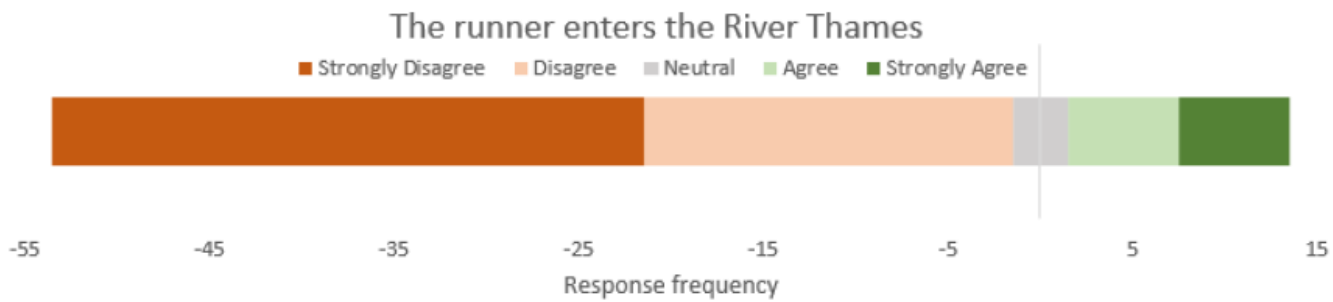
Are the differences in responses significant?

Freidman test for significance

Test Topic	Chi-Squared Decision Rule (χ^2)	Chi-Squared Result (χ_r^2)	H_0	Outcome
Deviations/jags from line	5.99	3.4	Accept	No statistically significant influence between causes identified
Variations in Thickness	5.99	0	Accept	No statistically significant influence between causes identified
Variations in colour value	5.99	0.4	Accept	No statistically significant influence between causes identified
Variations in dash frequency	5.99	3	Accept	No statistically significant influence between causes identified

- Non-parametric, ordinal data. More than 2 groups.
- No statistical significance between the line styles
- Also true for differences between the stress interpretations.

Line styling cont.

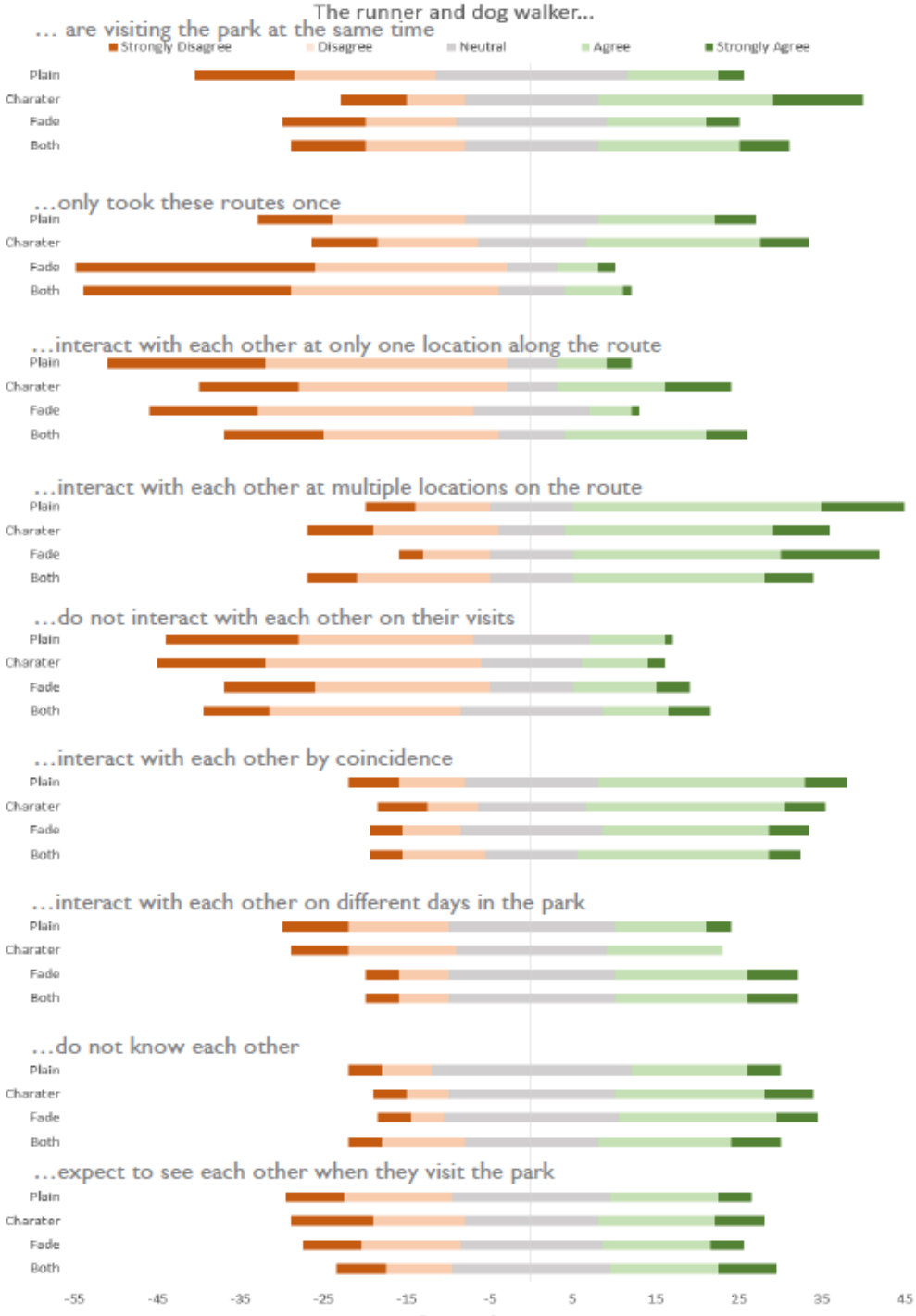


- Clear that there is an influence on the line rather than it being an explicit path

- Most associations made were spatial rather than platial

- Thickness -> Path width/size
- Dash -> Path type
- Jagged -> area of bad GPS signal / electrocardiogram (platial?)

Place Ballet Results



Freidman test

The runner and dog walker…	Chi-Squared Decision Rule (χ^2)	Chi-Squared Result (χ_r^2)	H_0	Outcome
…are visiting the park at the same time	7.81	12.12	Reject	There is a significant difference between visualisations
…only took these routes once	7.81	19.44	Reject	There is a significant difference between visualisations
…interact with each other at only one location along the route	7.81	6.60	Accept	There is not a significant difference between visualisations
…interact with each other at multiple locations on the route	7.81	1.56	Accept	There is not a significant difference between visualisations
…do not interact with each other on their visits	7.81	9.36	Reject	There is a significant difference between visualisations
…interacted with each other by coincidence	7.81	2.76	Accept	There is not a significant difference between visualisations
…interact with each other on different days in the park	7.81	3.60	Accept	There is not a significant difference between visualisations
…do not know each other	7.81	4.44	Accept	There is not a significant difference between visualisations
…expect to see each other when they visit the park	7.81	3.48	Accept	There is not a significant difference between visualisations

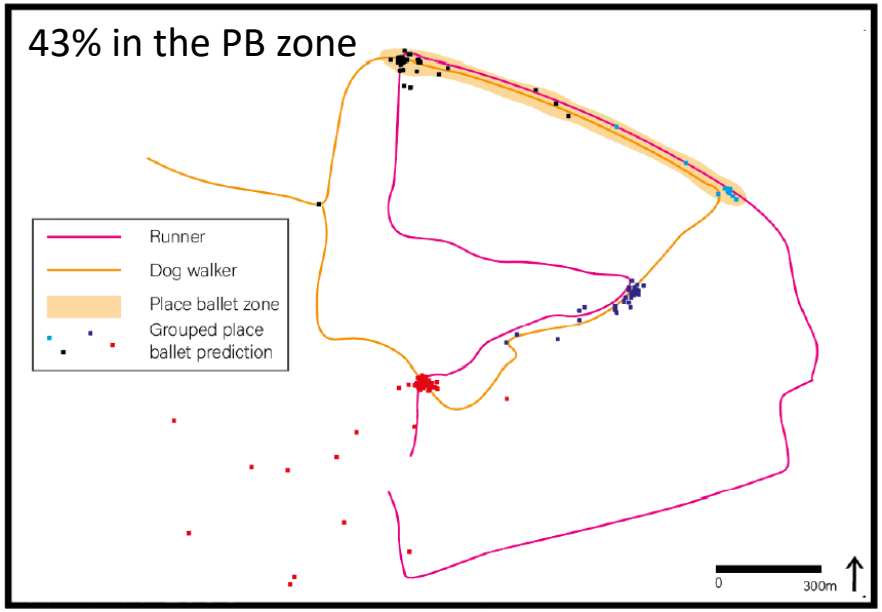
Post Hoc Analysis: Dunn Test

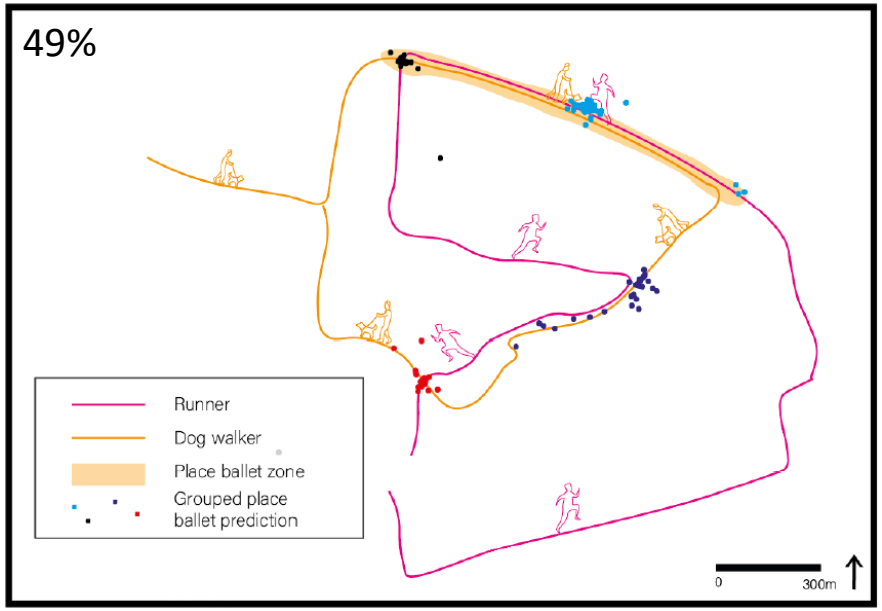
- Critical Value = 0.05

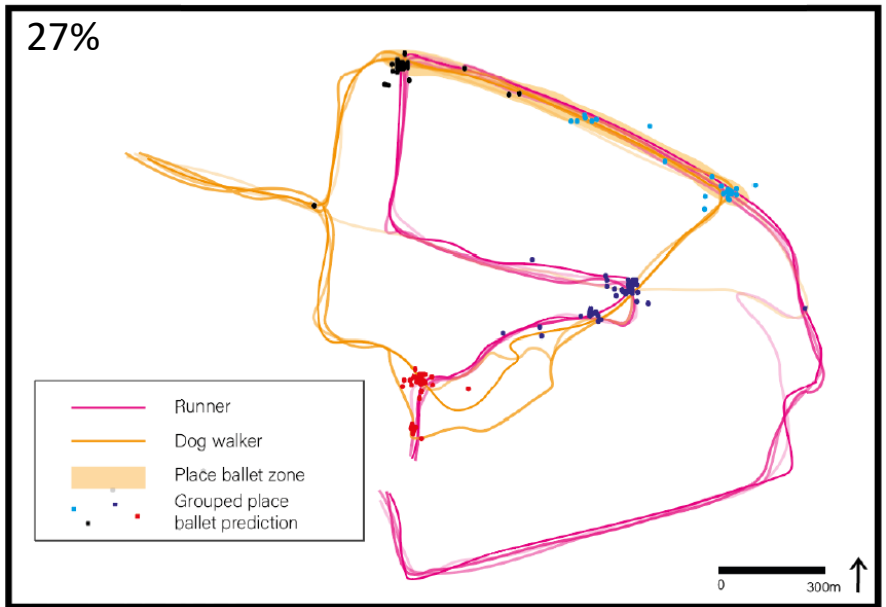
	The runner and the dog walker...		
	...are visiting the park at the same time	...only took these routes once	...do not interact with each other on their visits
Plain & Character	0.001	0.32	0.9
Plain & Fade	0.43	1.01×10^{-5}	0.32
Plain & Both	0.094	1.3×10^{-4}	0.09
Character& Fade	0.01	1×10^{-7}	0.38
Character & Both	0.12	1.3×10^{-6}	0.12
Fade & Both	0.41	0.54	0.53

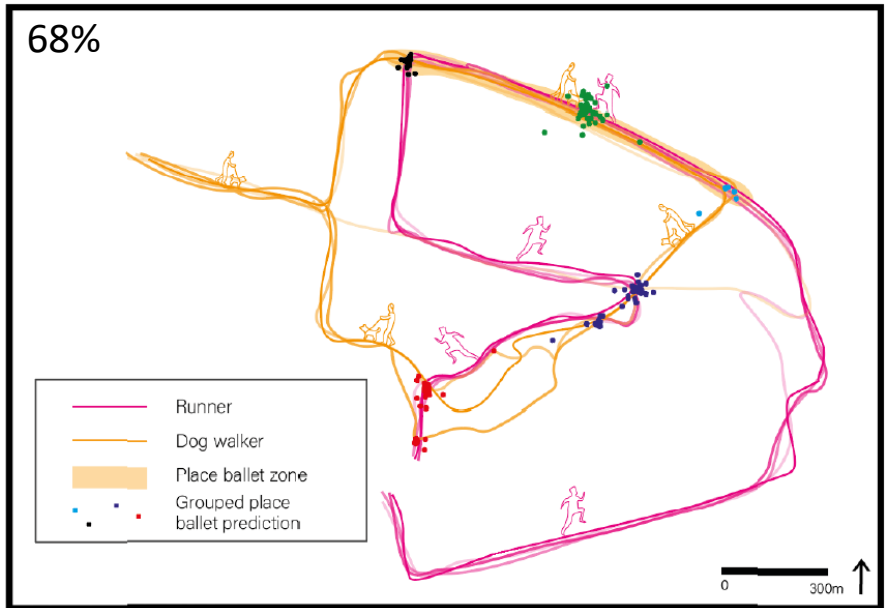
- Character put the persona's in the park at the same time. (Temporal)
- Fading lines infers a routine element to the routes. (Temporal).

K-Means Cluster Analysis

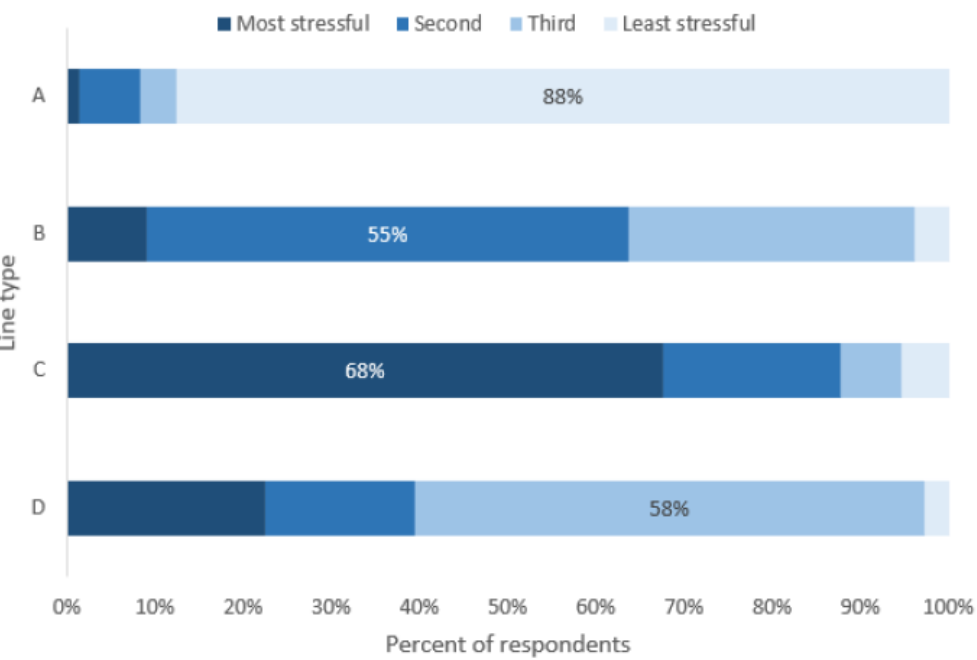


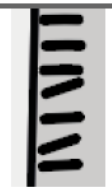




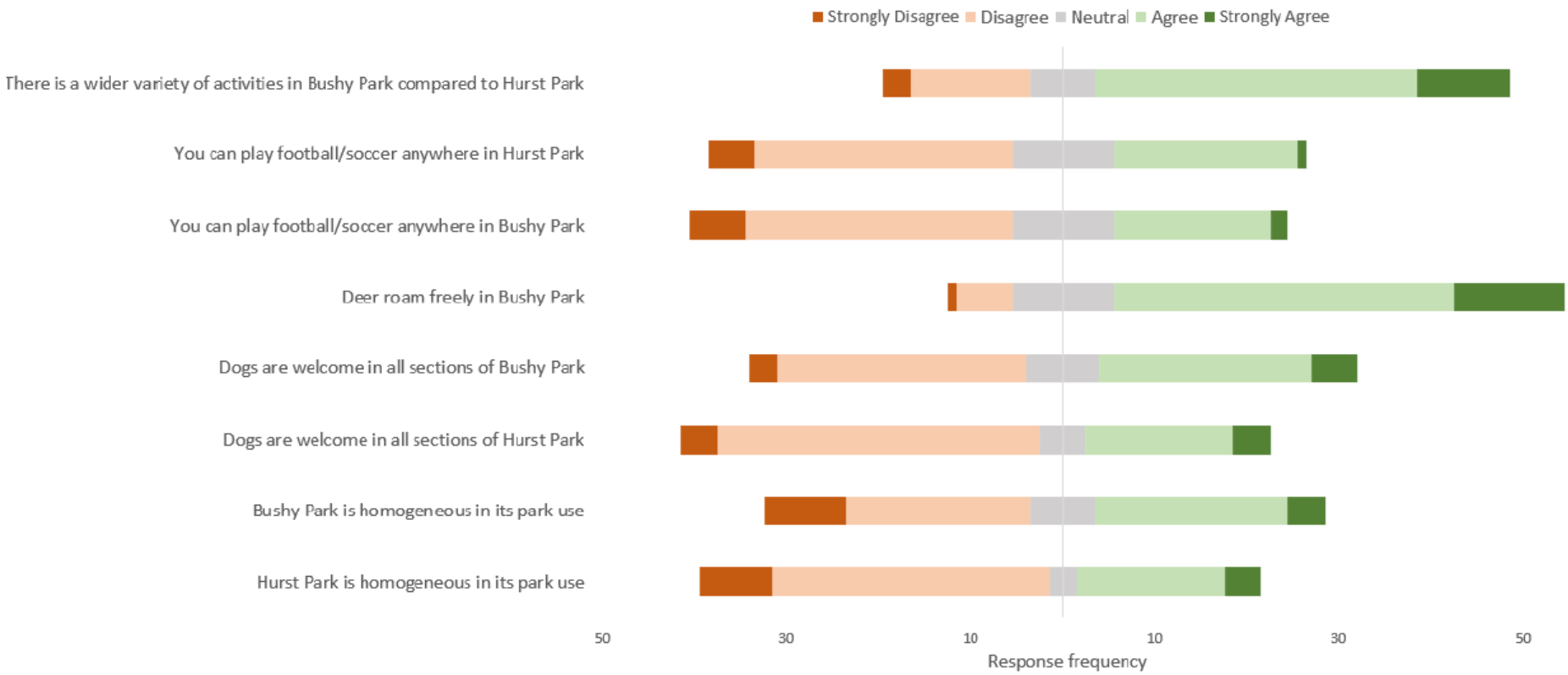


Results: Radiating Line Styles



Rank	Style	Example	Percentage selected at this rank
1st – Most stressful	C		68
2nd	B		55
3rd	D		58
4th – Least stressful	A		88

Results: Affordances in Subregions



Students T-Test

- Between the comparable statements

Statements	Critical Value	*p*-value	H_0	Outcome
Bushy/Hurst Park is homogenous in its park use.	0.05	0.0022	Reject	There is significant difference between the two statement responses.
Dogs are welcome in all sections of Bushy/Hurst Park.	0.05	0.066	Accept	There is no significant difference between the two statement responses.
You can play football anywhere in Bushy/Hurst Park.	0.05	0.10	Accept	There is no significant difference between the two statement responses.

- It can be inferred from the two maps that Bushy Park is more homogeneous in its use than Hurst Park
- Conflicts with persona interviews
- Less noticeable subregions?

Conclusions

- Using the jagged line style has shown to be the most likely to successfully communicate stress and a changing sense of place along a route.

- Techniques have been developed to communicate place ballets temporal nature and location.

- A hierarchy of radiating line styles has been established that enables the mapmaker to better communicate relative levels of experienced stress and atmosphere

- The use of a subtle icon layer has enabled the mapmaker to better convey the affordances of subregions within a defined area

Moving forward

- Hone in on one research direction
- Place Ballets - Interactional & Geographical development

- Allows for greater communication of a persons experience with place.
- Can document how individuals interact with different places
- Trend identification, modification of place

- Can platial depictions be a substitute for travel? COVID-19

- Plenty of personas and persona experiences remaining to experiment on!

References

- Bogucka, E., P. (2019, August). *Cartists and artists - the bonds between modern cartography and art.* Presented at the Cambridge Social Dynamics Team Seminar series, Cambridge.
- Bogucka, E., P. & Meng, L. (2019) Projecting emotions from artworks to maps using neural style transfer. *Proceedings of the ICA.* 2(9). DOI:10.5194/ica-proc-2-9-2019
- Cuffe, G. (2017, October 17). 'Red deer captured on camera in Bushy Park'. *The Richmond and Twickenham Times* . www.richmondandtwickenhamtimes.co.uk/news/15600708.red-deer-captured-on-camera-in-bushy-park/
- Eck, D., & Pijpers, R. (2017). Encounters in place ballet: A phenomenological perspective on older people's walking routines in an urban park. Area, 49(2), 166–173. https://doi.org/10.1111/area.12311
- Fuller Maps. (n.d.). Bristol. https://fullermaps.com/artworks/bristol
- Goodchild, M., F., & Li., L. (2011) Formalizing Space and Place. CIST2011 - Fonder les sciences du territoire, Nov 2011, Paris, France. Proceedings du 1er colloque international du CIST. pp.177-183. Fonder les sciences du territoire.
- Hancock, J., G, Hanworth, H., Hill, S. and King, S. (2018). *The Art of Map Illustration*. USA: Quarto Publishing Group.
- Hauthal E., Burghardt, D., Dunkel, A. (2019). Analysing and Visualizing Emotional Reactions Expressed by Emojis in Location-Based Social Media. *ISPRS International Journal of Geo-Information.* 8(3). 113. p16. https://doi.org/10.3390/ijgi8030113
- Hunt, R. (n.d.) Boy's Life National Scout Jamboree Map. https://rodhunt.com/boys-life-national-scout-jamboree-map
- Seamon, D., & Nordin, C. (1980). Marketplace as place ballet: A Swedish example. In Landscape (Vol. 24).

Thank you for listening

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