

Glasgow: Smellmap

Kate MCLEAN

Canterbury Christ Church University

Abstract. In September 2012 Glasgow Science Museum exhibited Kate McLean's map of the city based solely on its smells. Incorporating visuals of identified city-specific scents and bottled scents (~~created from natural substances~~) the map invited the audience to interact with the exhibit and to contribute their own placement of the scents across the city. The function of such smellmaps is to explore new ways to depict cities other than purely visual, encouraging tourists and visitors to explore and find their own city experiences, which thereafter become memorable through a direct link with smell. ~~Sensually based memory is an area of increasing interest for the tourism industry whose higher end clients, tiring of activity based experiences, are seeking to reactivate and relive the good feelings. Mendiratta (2010) suggests that the tiniest aromas and sounds can have a profound emotional effect.~~

Every scent is carefully chosen, by a combination of crowd-sourcing and the "weight" of its story. Every smell has a story: ~~the memorability or memory invoking scale of individual scents and how~~ they work together to form a smell portrait of the city (history, architecture, culture, attractions, people). ~~The maps are designed to be questioned and intended for people to ascribe their own smells to places.~~

This paper will describe the evolving methodology used to generate the data, the design considerations and the creation – successful and otherwise – of using naturally-occurring scents for display purposes in a museum/gallery setting.

Keywords: smellmap, tourism, urban

Kommentar [KW1]: Abstract is a bit long - usually 150 words or so.

1. Introduction

1.1. Smell and cartography

Smell is underrepresented in cartography; smells are difficult to work with; they are volatile, disperse readily and small variations in our own location can mean we perceive very different smells from a person standing next to us. With the number of potential smells in existence ranging from 4,000 to 400,000 (Gilbert, 2008) it is daunting to develop coherent visualization models. In order to explore how odour resonates with people, and their recollection of a specific environment, this art-based combination of cartography and smell was designed as a participatory exhibit to promote popular debate about odour perception in the city of Glasgow. Margolies (2006) suggests that smells are “notoriously difficult to capture or record”; whilst maps exist as a plan view, smells are constructed from a human view on the street creating what “seems to be a contradiction between ‘smelling’ and ‘mapping’”. My argument is that separate sensorial elements of design can augment understanding of the other. The Glasgow smellmap is designed as a multi-sensory map comprising smell, visual and word to engage the viewer/“bouqueteer” in the creation of their own city smellscape (Porteous, 1985) and develop memories of their own sense of place.

1.2. Smell and memory

Memory evoked by smell is powerful – the flashback of Proust’s *petites madeleines* that take him back to his childhood in Combray is often-cited as a testament to the emotional anamneses generated by odour. Physiologically (Herz & Engen, 1996) suggest that “Only two synapses separate the olfactory nerve from the amygdala, which is involved in experiencing emotion and also in emotional memory.” “Indeed this may be why odour-evoked memories are unusually emotionally potent.”

1.3. Sensual stimuli in tourism branding

In 2010 the CNN Task Group compiled *Insights into Tourism Branding* Mendiratta (2010) in which they claim that as we travel frequently individual places become a blur but that sensory stimuli can be used to retain and relive an emotional response to a place. “Neatly and discreetly packed away into our cellular memory, our senses have captured split seconds of time from across the globe, and across our lives.” (Mendiratta, 2010) The suggestion is that these sensory memories may be re-triggered at random moments which then enables us to “travel back to a place in the world and in the stories of our lives.” (Mendiratta, 2010). I suggest a smellmap may be one way to address personal smell data detection, encoding, storage and randomly-triggered retrieval for use in the promotion of urban tourism.

Kommentar [KW2]: This reference raises a red flag for me - I'd be careful about citing marketing reports. You could handle in one of two ways - acknowledge that the research in it might not be sound, or more simply don't cite the name directly here - put in the references and just cite the author here: "Mendiratta (2010) claims that..."

1.4. Previous smellmaps

Prior to Glasgow I had researched and designed two smellmaps; one of Paris and one of Edinburgh. The Paris smellmap was a virtual walking tour of a city bottled as discrete scents. The Edinburgh smellmap focussed equally on a visual depiction of the smells as well as the smells themselves. The methodology evolved from a personal art project to a more research-driven depiction of public perception of a city's distinctive smells.

1.5. City selection for case study

Glasgow was chosen as the city for the third case study as a comparison to Edinburgh (the case study for a previous smell map). Local lore indicates a fierce rivalry between Scotland's capital, Edinburgh and its second city, Glasgow including tourist visitor figures indicated in an article by the *Daily Mail* online in October 2011. I decided that smell perception of two rival but geographically close cities was worthy of study.

1.6. Research methodology

There are two approaches to smell data and collection in the art-based practice of mapping smell: scientific using artificial noses with gas chromatography and mass spectrometry as used by Agapaksi and Tolaas (2012) and phenomenological used by McLean, me but both commence with a personal tour of the city in question, sniffing out of likely smell sources after studying a map for geographical, architectural and linguistic clues.

This project takes a phenomenological approach employing techniques similar to those used by Thibault in the SAID-NOHA project which use methods that depend on "the 'lived experience' or the 'experience *in situ*'" (Thibault, 2010). Where Thibault employ three successive methods "*I, you and it*", I make use of three non-successive methods "*I, you and recollection*". During the *I* phase I experienced the smells of the city through individual open walks that resulted in data collected from personal perception and conversations. The *you* phase involved smellwalks (Henshaw, 2011) where I as the researcher shared the experience of walking a route, predetermined only by starting point and length of time, with a subject. My subject often guided me and the smells were noted (by me) as the subject perceived them, in real-time as well as through storytelling. The *recollection* phase involved semi-structured interviews with carefully selected interested subjects who had links with the city of Glasgow. They came from personal contacts, local authors, social media and local media. To record the collection of smells I employed both visual and linguistic cues from photographs, sketches, sketch maps, watercolours and lists enabling a fuller understanding of how the smells may work together visually in the practice phase.

Formatiert: Schriftart: Kursiv

Kommentar [KW3]: Yikes - speaking of dodgy references! See if you can reference the original report the figures came from, or at least cite last name of the reporter here. Regardless, you should have a reference here.

Kommentar [KW4]: Need to either include year here if you're citing some research that details your methodology. Or simply say 'me'

A broader issue to think about for future is sampling strategy. Who are your participants, how were they selected, are you claiming that they're representative of the population of Glasgow? See e.g. Robson for more on this.

Kommentar [KW5]: There's a method called 'stimulated recall' that is relevant here. Do a search for it sometime - interesting and useful.

2. Smell perception, identification and recording

2.1. “I” – Open walks

Figure 1 lists smells I perceived on a walk along Byres Road in Glasgow’s West End in October 2011. This particular road was suggested for the number of bars and restaurants and its proximity to the university.

My second visit was to a historic market place, the Barras, in Glasgow’s East End recorded as a watercolour and ink sketch **Figure 1**. “I detected the soft smell of cheap polyester clothing and acrylic knitwear in many sections of the market although the strongest smell accolade goes to square Lorne sausage frying in the cafés.” (McLean, October 26 2011) ~~LORNE SAUSAGE~~

The third walk was to verify a smell of fresh air. “I started at the Necropolis... I had envisaged a low-lying, boggy atmospherically draped mist-drenched collection of crumbling tombs. Instead I found a well-tended selection of elegantly carved, dark rock, Victorian grave markers and the smell of fresh air... or was it? ... I tried to isolate what I could smell. In the end I found it to be sodden sphagnum moss. The moss is now drying out, I want to see how its scent changes and then I will soak it again, in fresh and in rainwater and see if I can smell the difference. I can report that in my nose Glasgow Green does not smell of fresh air...” (McLean, 2012)

2.2. “You” – Commented Walks

In the second stage – “you” – November 25, 2011. “...I walked in the company of S1... Half way along Argyll Street the strongest smell was inside the “Gaming Cashino” – it stank of air lemon-scented freshener. As an employee told us; “you need the stuff to disguise the smell of the customers”. The shops all smelled of their contents: acrylic wool sweaters, plastic soles for fake fur boots, cheap trainers. The smells were strongest at the entrances where the heating and ventilations systems seem to collect and pump the synthesised scents onto customers. ~~LEMON SCENTED CLEANER (later rejected)~~

“Walking up High Street I sniffed out a brewery that I was not expecting to find. This is the sniffers magic moment - being able to identify a smell without your eyes telling you what it is. Locals and commuters all mentioned the smell of rubbish, garbage, sewerage... the smells of the back streets that spill out over the buildings and along the alleyways. One derogatory comment summarised this perception – “welcome to Glasgow Shitty Centre”. ~~GARBAGE (later rejected)~~

“S1 identified a subtle odour of frying fat hanging over every location we visited. I think it came from the Expelair fans in all the fast food outlets

Kommentar [KW6]: What are these things in all caps?

Formatiert: Textkörper-Zeileneinzug

Kommentar [KW7]: These paragraphs seem to be one long quote - is that right? If so should be indented instead of in quote marks.

and street cafés.” (McLean, 2011) ~~FAT-FRYING~~ **Figure 2.** Argyll Street. Sketch Map. Kate McLean 2011

S2 had provided me with a list of Glasgow smells via email, some peripheral to the city and others in the centre, she also described the culture of living in Glasgow and the importance of dressing up to go out shopping and clubbing as well as the massive influence of football on the community. We drove and walked together to witness the smells in situ. ~~PERFUME. HOT BOVRIL AT THE FOOTY~~ **Figure 3.** Comments. List / Sketch page 1. McLean, 2011

Kommentar [KW8]: Raises interesting point about interpretation. That opens a whole can of worms, but worth getting into at some point.

2.3. “Back Then” – Interviews, blogs, chats

“Michael Meighan author of ‘Glasgow Smells’ and ‘Glasgow Smells Better’ specialises in Scottish industrial history... he described the changing smell landscape... of Glasgow’s River Kelvin that derived from the paper mills of the industrial revolution up until more recent times. The water would smell of a combination of sulphuric acid and caustic soda used in the process of boiling the rags and bleaching. The results were toxic. The end result – no fish in the Clyde and an evil odour. ~~RIVER CLYDE~~

Formatiert: Textkörper-Zeileneinzug

“He then described Glasgow’s heritage of seemingly constant building work and I had identified “building dust” as one of my current Glasgow smells. From 1855 Act for access to a privy the Glasgow “slums” were knocked down and “modern” housing was erected. East Kilbride used to smell of concrete as Scotland’s first new town was constructed in 1947. Now the 1970s Newbery Tower on Renfrew Street is being demolished in favour of a new glass building. Glasgow, it appears, constantly re-builds and recreates its architecture. ~~BUILDING DUST~~

“I showed him (Meighan) Terakopian’s 2010 photograph **Figure 4.** of the Glasgow industrial skyline from the Necropolis... and this prompted another line of throughout about Glasgow – the smells of fresh air, of escaping the city either through Possil towards the hills, via the West Highland Way or sitting on top of Kelvingrove Park before dawn. The fresh air is “in”. ~~FRESH AIR (altered to MOSS)~~

“We finished on the smell of carbolic and the disinfectant scent of cromesol which used to tell you that you were in a medical institution be it pharmacy, hospital, doctor or dentist surgery... Smell is associative, it conjures vivid memories and recollections and as such I suggest smell map research will always contain a large historical element. ~~CARBOLIC SOAP~~

“Still at number one, and plotted just yesterday is the smell of the Glasgow subway – it is not diesel as I first thought but electrical, using tram

car engines. How to bottle “electrical warm damp” is going to be a genuine challenge.” [SUBWAY](#) (McLean January 4, 2012)

S3 contributed [via blog feedback](#): “I heard the piece on Radio Scotland this afternoon about your city smells project and it really struck a chord with me about the evocative nature of smells and their affinity with other memories. The damp earthy smell of the underground has always been a very “Glasgow” smell for me and an odour I could happily absorb all day and every day. In some ways it creates a very comforting feeling. Maybe it reminds me of being on the underground as a youngster with my mother! [\(via Blog feedback\)-SUBWAY](#)”

S4 told the story of the “stair”. Glasgow tenements were often filled with extended families each with their own flat that shared a communal tiled entrance hallway and the stair. Every week they would take it turns to clean it – you could tell if it had been done by the smell of carbolic soap.

KM: “Are these by any chance the types of tiles that you recall from Glasgow stairs?”

S4: “That’s them Kate and the smell of carbolic soap..... Happy Days..” [CARBOLIC SOAP](#)

This multi-method approach to data collection is important to generate a range of smell options for the next stage of the process; smell selection. At one point I had 26 possible smells [that all had equal legitimacy](#) to represent their city.

Kommentar [KW9]: Blog feedback is maybe a legitimate medium for data collection, but best I think to take this out and just say "S3 contributed..." Then put the blog as reference at end of quote.

Kommentar [KW10]: I would remove this bit

Kommentar [KW11]: Equal according to what measure?

3. Smells: selection, creation and issues

The choice of smells is an iterative process. I select, test, sketch, compose and imaginary city scent based on the research until I reach a balance, or harmony, of the character of the people, the city, the climate, the economic climate. If the smells have [compelling narratives](#) [by my judgement](#) then I include them; if a story does not resonate or work with the other city smells to form an overall portrait then I reject it. Some practical consideration is taken as to how, and if, I can recreate the smells for exhibition. The lemon-scented cleaner went out because the scent is too generic. I verify smells in selected locations – this resulted in the moss being replaced “fresh air”.

Kommentar [KW12]: by your own judgement?

Scent/smell	Represents	Scent construction
Perfume	Shopping and clubbing	DKNY Summer eau de toilette
Fast food outlets	Pervasive and ubiquitous	Newsprint soaked with

Formatiert: Links

Formatiert: Links

Formatiert: Links

	<u>tous day and night aroma</u>	<u>fatty chips with salt and a little vinegar</u>
<u>Wet moss</u>	<u>Glasgow's green spaces</u>	<u>Wet moss, kept in plas- tic bags, fresh piece crushed every morning</u>
<u>Building dust</u>	<u>Regeneration and con- struction</u>	<u>Deust collected from a shopfitting that includ- ed brick dust, plaster dust and saw dust. Mixed with tap water and shaken every morning</u>
<u>Diesel fumes</u>	<u>Public transport links</u>	<u>Toxic, therefore not created</u>
<u>Carbolic soap</u>	<u>Cleaning the "stair" in tenement buildings</u>	<u>Grated carbolic soap</u>
<u>Lorne (Square) sausage</u>	<u>Barras market and all mobile food outlets next to building sites</u>	<u>Fatty run-off from pan- fried Lorne sausage (no extra oil or butter)</u>
<u>Hot Bovril at the footy</u>	<u>Local commitment to football</u>	<u>Neat bovril</u>
<u>River Clyde at low tide</u>	<u>City artery with its own tales and next to the exhibition site, Glas- gow Science Centre</u>	<u>Wwater from the Clyde with muddy brown deposits dredged from the bottom of the river using a boat hook. With thanks to Glasgow City Council and Alan and Malcy, the dredger crew</u>
<u>Subway</u>	<u>Comforting smell of childhood, distinctive and memorable</u>	<u>Eelusive and difficult – described as electrical ozone, metallic damp sponge. First attempt nails in water and a piece of sponge. Needs humidity/warmth. Sec- ond iteration of a distil-</u>

Formatiert: Links

		<u>lution of rusty water</u> <u>panel pins, panel pins</u> <u>and bicycle oil, washer</u> <u>combined with sponge.</u>
--	--	---

- ~~Perfume (shopping and clubbing) — although the sampled population on Buchanan Street suggested Chanel Chance my budget only ran to a DKNY Summer eau de toilette~~
- ~~Fast food outlets (pervasive day and night aroma) — fatty chips with salt and a little vinegar on newsprint~~
- ~~Wet moss (Glasgow's green spaces) wet moss, kept in plastic bags, fresh piece crushed every morning~~
- ~~Building dust (regeneration) — dust collected from a shopfitting that included brick dust, plaster dust and saw dust. Mixed with tap water and shaken every morning~~
- ~~Diesel fumes (public transport links) — toxic, therefore not created~~
- ~~Carbolic soap (cleaning the "stair" in tenement buildings) — grated carbolic soap~~
- ~~Lorne (Square) sausage (Barras market and all mobile food outlets next to building sites) — Fatty run off from pan fried Lorne sausage (no extra oil or butter)~~
- ~~Hot bovril at the footy (local commitment to football) — neat bovril~~
- ~~River Clyde at low tide (city artery with its own tales and next to the exhibition site, Glasgow Science Centre) — water from the Clyde with muddy brown deposits dredged from the bottom of the river using a boat hook. With thanks to Glasgow City Council and Alan and Malley, the dredger crew~~
- ~~Subway (comforting smell of childhood, distinctive and memorable) — elusive and difficult — described as electrical ozone, metallic damp sponge. First attempt nails in water and a piece of sponge. Needs humidity/warmth. Second iteration of a distillation of rusty water panel pins, panel pins and bicycle oil, washer combined with sponge.~~

Kommentar [KW13]: What is this list? Are these the final selected scents? Can you put them in a table?

Formatiert: Standard, Einzug: Links: 0,63 cm, Hängend: 0,63 cm

Formatiert: Standard

Smells cross contaminate readily. Perfume, the strongest scent, will eliminate the more subtle odours. Each scent is bottled in an aromatherapy bottle with an aluminium lid. The lids are colour coded and when exhibited they are removed at the start of every day. The smells are kept at a distance from each other through a bespoke box that separates the scent bottles.

Scents generated from natural materials have a shelf life. Moss is the quickest smell to diffuse and requires re-crushing every day. The DKNY perfume will last for many years. Longevity can be addressed through reproducibility

by chemical reconstruction of scents as used by Tolaas (2012) but for this work I wanted to work with natural odours for a level of connection and authenticity.

A previous smell map exhibit in Edinburgh indicated to me that an intensity scale enhances the participatory experience of the audience by managing their expectation of the level of power of each of the smells.

4. Visual Creation

Every smell has an origin (a location), a range, intensity and a direction. I plot the smells using selected data from interviews and personal observation ~~as well as specific searches using a variety of searches~~. I use a base map from Google to place the smell sources relative to each other. After the smells are plotted I remove the base map thus all geospatial locators – this is how I engage the viewer in a three-way dialogue between visual map, scent and personal knowledge of the city in question.

Glasgow smell colours derive from visuals of the smell sources. See **Figure 5**. Each smell source was spot sampled 3 times producing a range of shades, individual colours were then tested and final selection made based on clear differentiation when combined on the final map. I tried a number of background colours but finally elected to represent Glasgow's grey dreich through the choice of tracing paper as a printing material.

During a smellwalk through Glasgow one of the walkers mentioned that Glasgow's smells seem to hang in the air, that the climate of the pervasive dreich during the winter months (when the map research was conducted) forms an impression of smells that linger as small droplets in the air. This was the inspiration for the symbol design for the Glasgow smellmap. I retained key elements from the visual language I created for the Edinburgh smellmap in which "coloured dots indicate the point of origin of the scents, the contour lines show where they blow to in the wind." (McLean, 2011). I used coloured dots to indicate the sources of the smells and smell contours are made up of coloured tiny dots generated as symbols, which form concentric circles hinting at the smell range. See **Figure 6**. Smell direction is based on Glasgow's prevailing wind, which is south-westerly. The graphic is manipulated to reflect this.

All type is set in Neutraface 2, a geometric, architecturally-inspired sans-serif face by Christian Schwarz (House Industries). Based on my desire to allude to one of Glasgow's major tourist attractions; the art and architecture of Charles Rennie Mackintosh and the Art Nouveau movement without the

Kommentar [KW14]: ?

distraction of the decorative Adobe Originals Willow typeface by Joy Redick. All type is set in grey in keeping with the winter research.

4.1. Printing stock

The Glasgow Smellmap is digitally printed on architect's trace paper to further allude to the mists and dreich of the winter and to meet my concept for its installation.

4.2. Participatory exhibition decisions

The intent is to hang it in a window looking out over the river and the city to communicate the translucence and ephemerality of smell suspended in the winter dreich. The Glasgow Smellmap is exhibited with a light shining from behind, the smells are separated from each other in bottles. I am currently testing new feedback options.

5. Conclusion

As a tool for understanding and promoting the unique character of the city the map and scents reflect the pride of Glasgow's citizens; their ability to renew, regenerate and reinvent themselves and their buildings as other scents illustrate the culture and geography of the city. As an overview it is successful. Televised commentary at the exhibition suggested that not everyone agreed with the choice of smells – this meets the original aim of the map provoking the debate about the smells of the city.

In its second aim of provoking opinion and personal response to a city's smells the map was successful through media coverage, including newspaper articles, radio and TV and exhibition. Publically acknowledging that the city of Glasgow has smells, and unique ones that are memorable, is a notable step in the direction in recognizing cities for their smell diversity and individuality.

In its third aim to “render legible the complex, dynamic, living entity that is a city” (Cosgrove, 2004) sensory mapping connotes a practical way of apprehending aspects of the complex sensory world. The map uses visual metaphor to catalogue and organize smell perceptions and is partially successful in its uses of colour and symbols to create an idea of as representations of the dynamic and temporal aspect of smell. The exhibition at the Sidney Cooper gallery showing the printed tracing paper map suspended in front of a light source was far more successful in communicating the ephemeral qualities of smell as the dots appeared to be floating like the smells on a damp and cold winter's day in Glasgow than the GSC exhibit. A smell map is a perceptual experience that reorganises materiality of urban

Kommentar [KW15]: successful according to what criteria?

Kommentar [KW16]: same

space to concentrate attention on the sense of smell; through the removal of the geospatial I have attempted to show just the smells and their movement through design. However, the map fails to achieve the representation of the world as a dynamic entity despite the graphics – an alternative medium may be better suited to this.

In its aim of mapping what the senses detect in an urban context the Glasgow smellmap is a pilot study for a ~~future-developing~~ methodology. Ultimately it is through ~~its~~ circulation and dissemination that personal smellmaps are evoked for individual viewers/bouqueteers as they question whether scent can be mapped. As a means of communicating the world through the sense of smell the Glasgow smellmap scents ~~are partially successful~~ vary in emulating the actual smells. ~~some of the smells are “true to life” but some fall short of the desired outcome.~~ Limitations include the enclosure of smells in bottles where in reality we smell in a larger smell environment.

The wider issue of maps and smell is one that questions whether maps can be used to represent the sensory landscape? “As interest has shifted from the map as *object* to mapping as *practice*” (Crampton, 2013) the Glasgow smellmap provides a commentary mediated by the artist of a temporal landscape. The process of smellmapping and subsequent participatory exhibition are in their infancy as communication devices for the urban landscape.

References

Agapakis, C and Tolaas, S (2012). *Smelling in multiple dimensions*. Current Opinion in Chemical Biology 2012, 16:569–575. Available at: www.sciencedirect.com (Accessed March 2013)

Cosgrove ~~(reference to be added)~~ in Abrams, J and Hall, P (2006). *Else/where: Mapping – Cartographies of Networks and Territories*. University of Minnesota Design Institute

Gilbert, A (2008). *What the Nose Knows*. Crown Publishers, New York

Henshaw, V (2011). *The Role of Smell in Urban Design*. School of Computing, Science and Engineering. University of Salford, Salford, UK

Hertz, R and Engen, T (1996). Odor memory: review and analysis. In *Psychonomic Bulletin & Review* 1996, 3 (3), 300-313. Available

Kommentar [KW17]: by what measure? If it's your own belief, it's OK to say so.

Formatiert: Schriftart: Kursiv

at: <http://link.springer.com/article/10.3758%2F03210754?LI=true#page-2> (Accessed October 2010)

Margolies, E in Drobnick, J (2006). *Vagueness gridlocked* in *The Smell Culture Reader*. Berg, New York

McLean, K (2011). *ECAStudent Blog*. <http://ecastudent.blogspot.co.uk>

McLean, K (2011). *Sensory Maps Blog*. <http://sensorymaps.blogspot.co.uk>

McLean, K (2011). *Smellmap Edinburgh*. [Original artwork available in National Library of Scotland](#)

Formatiert: Schriftart: Kursiv

Mendiratta, A (2010). *COMPASS – Insights into tourism branding*. Created for CNN's TASK Group Available at: www.cnnmediainfo.com/task/download/TASK_Compass_11.pdf (Accessed October 2010)

Formatiert: Einzug: Links: 0 cm, Erste Zeile: 0 cm

Perkins, C (2012). Introduction to Sensory Mapping, Smell and the City Workshop. Available at: <http://smellandthecity.wordpress.com/2012/03/31/smell-and-the-city-workshop-manchester-19th-march-2012/> (Accessed on 03/10/2012)

Porteous J Douglas (1985). "Smellscape". In *Progress in Physical Geography* September 1985 vol. 9 no. 3 356-378

Thibault, J-P (~~reference to be added~~2010). *Place attachment and physical detachment: the ambience of contemporary cities intra-muros*. Available at: http://www.pa.upc.edu/Varis/altres/arqs/congresos/third-international-seminar-arquitectonics-network-tercer-seminario-internacional-arquitectonics-network/comunicacions/said-noha/view?set_language=en (Accessed January 2013)

Formatiert: Englisch (Großbritannien)

Formatiert: Schriftart: 10 Pt., Nicht Fett, Kursiv

Formatiert: Schriftart: Kursiv

Formatiert: Schriftart: Nicht Kursiv, Englisch (Großbritannien)