

# WeCurate: Enriching the Sociocultural Practices of the Museum Experience

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**This paper reports on the evaluation of WeCurate, a synchronised image viewer that supports discussions of digital images of cultural artefacts. The evaluation was conducted at a London museum while it was installed as a multiuser interactive. The results from the trial reflected the dynamics and practices of social groups visiting museums, and revealed aspects of social interaction which should be considered when developing interactives intended to support collaboration.**

*Multiuser. Museum interactive. Social interaction. Cultural artefacts.*

## 1. INTRODUCTION

WeCurate was developed as part of an applied investigation into interactive technologies that afforded a discussion of cultural objects. It is a synchronised environment, where users can view and discuss images via a shared interface. For the study this paper reports on, the WeCurate software was installed at a museum as a multiuser interactive. To encourage the discussion, and give the activity some purpose, the group were tasked with curating a collection from the museum's image archive. Placing our system in a museum was an opportunity to consider how technologically mediated discussions might be incorporated into the existing sociocultural practices of visitors.

Though leisure orientated, most people go to a museum expecting to learn something, and many museum interactives reflect this approach of 'learning by doing' (Walker 2008). Visitors also attend museums in groups – schools, families, friends – and therefore view the exhibits as a group (Hindmarsh *et al.* 2005; Sanford *et al.* 2007; Hope *et al.* 2009). Consequently, visitors make sense of the museum's artefacts together (Ash 2002; Ellenbogen *et al.* 2004). If the design of a museum interactive aims to parallel visitors' habits and practices, it needs to accommodate social learning behaviours. This understanding of social practice is

reflected in attention to the development of museum technologies that support multiuser interaction, which WeCurate builds upon (Boehner 2005; Cosley *et al.* 2008; Cosley *et al.* 2009; Hope *et al.* 2009; Walker 2008).

At the time of the evaluation, our project was mid-way through its design process. The objective of the trial was to reveal patterns in interaction that emerged in use. The study looked to determine the types of social groups, and categorise their behaviour. As an ongoing investigation, the findings from the evaluation were intended to fine-tune further development.

The mediated discussion was structured into three stages: a quick selection scene, a forum for a fuller discussion and a voting stage. The WeCurate interface synchronised the workflow and representations of the group's activity. This enabled the group to reach a collective decision as to whether the image should be saved to a virtual exhibition.

To ease the navigation of the museum's extensive archive, WeCurate made use of autonomic agents to select media appropriate to the group. The agents made decisions based on the users' previous preferences, actions and the creation and

modification of user generated metadata. This paper focuses exclusively on the social behaviours observed during the trial; other aspects such as the autonomic agent design and technical implementation, are reported elsewhere (Yee-King *et al.* 2013).

## 2. DESCRIPTION OF SYSTEM

WeCurate managed the users' discussion in two ways. First, by direct communication to other group members. Users could set preferences, post comments to the group, tag the image and vote via the interface. The collective outcome of this activity was graphically represented across all the users' screens. To collaborate, users need to share mutual attention, mutual comprehension and interdependent behaviour within shared environments (Biocca & Nowa 2001). The representation of individual action and the coordination of the screens in WeCurate aimed to generate a sense of shared experience (Hope *et al.* 2009).

Second, by employing the use of autonomic agents to manage the discussion, and for more efficient navigation of the museum's extensive archive. The agents were active in selecting images for the group to view, and deciding if there was enough interest in the selected image. The users were presented with images from the archive, rather than shown search results. Consequently, the system was more akin to a broadcast model, than a browser. The selection of the image was determined by the group's interaction with the system.

As stated, WeCurate manages the group's discussion in three stages:

1. Selection scene: its purpose is to allow a quick decision as to whether an image is interesting enough for a full discussion. Users can zoom into the image and see the zooming actions of other users. They can set their overall preference for the image using a simple like/dislike slider, which also shows the preferences of other users in the group. The Selection scene is shown in Fig. 1.

2. Forum scene: if an image is judged to be interesting enough by the agents, the users are taken to the forum scene where they can engage in a full discussion of the image. Users can add, delete, weight tags, and can see the actions of the other users so they have a sense of what the group are interested in. They can also view images that were previously added to the collection. The Forum scene is shown in Fig. 2.



Figure 1: Selection Scene



Figure 2: Forum Scene

3. Vote scene: the decision is made to add an image to the group collection, or not, by voting. The voting scene is shown in Fig. 3.

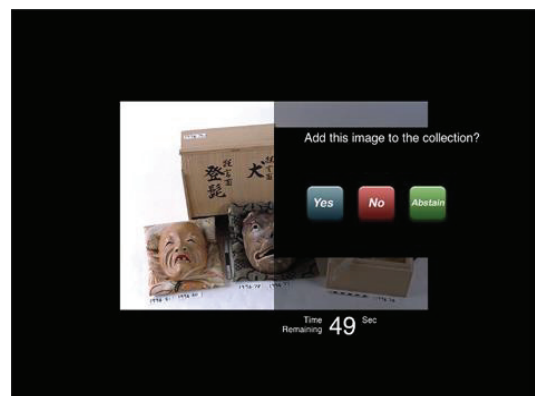


Figure 3: Voting scene

To coordinate the workflow, each scene had a timer which was activated when first clicked by a group member. The rest of the group would then be given 10 seconds to complete their discussion / action before being taken to the next scene.

### 3. RELATED WORK

This section considers work relating to the design of museum interactives for social groups, and tagging as a mechanism to encourage users to discuss and deconstruct images of cultural objects.

Museums are learning environments, but learning in this context should be an active and social process (Walker, 2008). Interactivity appears to be a positive direction to engage visitors (Heath *et al.* 2005). However, interactivity can be at the expense of social engagement. Interaction with single-user systems can be too absorbing, monopolising the visitor's attention, and resulting in impoverished co-participation, and cooperation (Heath *et al.* 2005). Rather Hindmarsh *et al.* (2005) suggest, interactive systems should look to make activities that give opportunities for conjecture, argument and challenge.

Accommodating social groups should enrich the activity of discussion and debate. Social groups can create a narrative which contextualise the exhibits (Walker, 2008). The group effort / ability is particularly relevant to viewing digitalised artefacts. Unlike the objects in the physical exhibits, the information provided by an archive as a database is unstructured, its meaning is abstracted, not curated (Walker 2008; Stylianou-Lambert & Stylianou 2010). Consequently, deconstructing digital imagery in this context needs the thinking and opinions of others to contribute to the meaning. Museum visitors can be intimidated to voice an opinion if it is viewed alongside, or in contention with, the authoritative voice of a museum expert, but are happy to leave personal or anecdotal information (Hellin-Hobbs, 2010 citing Looseley & Roberto, 2009). However, when using WeCurate, visitors were asked to add their voice to their peers' opinions and knowledge, and therefore were not put in a position of challenging an authoritative voice. Aside from two to three tags provided by the museum, the experts' voice was absent.

The gains from collective reasoning and collaborative discussions can be fostered by interactives so long as the affordances of those displays encourage multiuser interactions (Shtulman & Checa, 2012). Allen and Gutwill (2004) make a number of recommendations to ensure good multiuser interaction. The purpose of the system needs to be immediately apparent, as visitors are often time pressured and there are many points of interest competing for their attention. To promote collaborative behaviours, there should be features which allow multiple users to interfere with one another – so that individual actions are not isolated, but impact the group's activity and outcome of the task.

Approaches to design should differentiate between different types of museum visitors. Hornecker and Stifter (2006) note that different audiences will have different motivations for visiting. For example, the older generation are nostalgic to see historical objects which may be part of their youth. While parents will assist children's learning, by framing the meaning of the objects in terms comprehensible to the child (Shtulman and Checa, 2012). However, accommodating families can be challenging, particularly as children can break expectations and use technologies beyond their intended use (Hope *et al.* 2009).

There are also the varying dynamics within social groups to consider. As stated, parents are likely to play a significant role in guiding the children's engagement and learning by focusing and directing attention. To better support parent-child groups, Hope *et al.* (2009) suggest that screens across devices should be coordinated, and that group members engaged with individual devices should remain within each other's field of view.

As Cosley *et al.* (2008, 2009), WeCurate incorporates tagging images as a shared activity to serve multiple purposes. Aside from assisting with navigating the archive, generating key words associated with the image asks visitors to think about the object's qualities and meaning. Tags provide a means of deconstructing the image into definable terms and characteristics according to the user's opinion (Golder and Huberman, 2006). As such, tags are not only associated with the items, but also subjectively with the users who created them, and meaningful within the group (Krause and Aras, 2009; Tso-Sutter *et al.* 2008). As a collective effort, this should create a sense of shared activity and social presence (Cosley *et al.* 2009).

### 4. STUDY

WeCurate was trialled at the Horniman Museum in London over a five day period. Visitors were asked to use WeCurate running on an iPad, in small groups of no more than four. Each group member had their own device, which was placed around a single table so the users were co-located, and therefore able to have verbal discussions while they used the system.

The evaluation collected qualitative and quantitative data from an automated log of users actions, questionnaires, observations and video recordings of use. The actions for 92 sessions were logged, but due to the need to support multiple participants it was not possible to record or take full field notes for every session. Consequently, 37 sessions were observed and coded, and only a small sample of these were video recorded. 48

participants completed questionnaires; most of these were adults as the questionnaire was unsuitable for very young participants.

The analysis of the data concentrated on the distinct interactive behaviours of different social groups. Taking a grounded theory (GT) approach, data was coded and categorised (Glaser 2008). Social interaction was first categorised as positive or negative to give an indication of whether the task was enriching or impoverishing interpersonal and collaborative behaviours. To establish the quality and dimensions of the social interaction, the evaluation considered the types of social groups, the length and breadth of discussions and negotiations between participants to complete the task. Attention was also focused on the degree of shared action and the participants' efforts to coordinate their actions with the group.

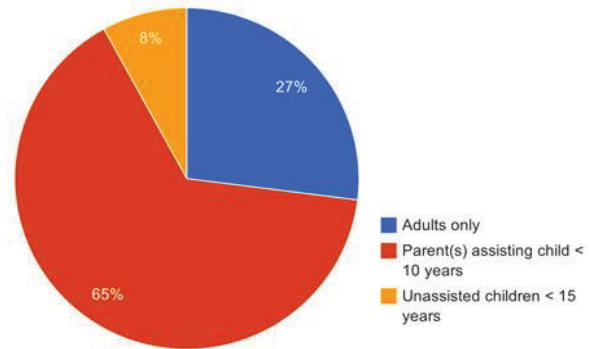
## 5. RESULTS

There were high variations in the time groups spent using WeCurate. The average time was 5 mins 38 secs, but with a deviation of +/- 4 mins 25 secs. The longest session logged was 21 mins 16 seconds. Due to the time differences in use, there was also a high variation in the number of images viewed, the average was 4.4 with a deviation of +/- 4.1. The maximum number of images a group viewed was 23, whilst the lowest was 1.

The feedback on the role of the agents was mixed. 43% felt they viewed the images they would have liked to see, but 75% stated that they had voted on the images they wanted. So, selecting the appropriate image for the group was not entirely successful, but the agents appeared to be effective in determining the level of interest when the group were viewing an image.

Of the groups, 83% of the participants were familiar, either as friends, family or colleagues, or a combination. The participants' ages ranged from 4 to 45 years. Throughout the duration of the trial only 1 participant was over the age of 45 years. Older visitors were certainly present in the museum, but were reluctant to engage with the WeCurate system. Participant's aged 10 years or under were almost always assisted by a parent.

Fig. 4 shows the three distinct groups that emerged during the evaluation: parents working with young children, adult only and child only groups.



**Figure 4:** Social groups

The use of WeCurate in the museum was largely dominated by children. In these sessions, the parent and child would share a single device, which allowed the parent to manage the child's interaction and completion of the task. In their interactions with the system and the task, 89% of these actions were initiated – the sequence of a discussion or course of action – by the adult.



**Figure 5:** Children using WeCurate with parent

Fig. 6 is very typical of the parent's role, guiding (often step-by-step) the children's action and interest, modelling subjective opinion and encouragement. Of the adult initiated behaviour, 40% directed the child's action and attention, and 45% was a request for an opinion about the image. The adult initiated dialogue also linked the image to objects the child would see / had seen in the museum. As 75% of the participants had previously visited the museum, they were already very familiar with the exhibits. The children did occasionally give an opinion without an immediate prompt, however the majority of their initiated action was by triggered observing the parent using the system.

((Participant speaking to child in response to the new image))  
 Parent. Oh:: that's beautiful.  
 ((Child looks but does not verbally respond))  
 Parent. Now (.) ((parent points to the screen.)) you press that button.  
 ((Child taps the screen)),  
 Parent. Well done.

**Figure 6:** Parent and child interaction (transcript)

No negative social interaction between parent and child was observed (i.e. scolding). Once the child showed evidence of disinterest, which occurred in 65% of the child and parent sessions, the parent would end the session. The parent-child did not collaborate with other parent-child dyads in the same group. The absence of discussion could be partially accounted for by the parent's preoccupation with supporting their child.

The children's tags varied. If supported, simple words were elicited and verbally spelt by the parent (i.e. a visible colour). If the children were unassisted, there were some attempts at adding tags (if they had adequate literacy skills), but quickly this would often shift to random typing.



**Figure 7:** Adult only group

In the groups with adults only, the social interaction was more diverse. From the observation data, 54% of social interactions were characterised as positive contributions to the task. Table 1 shows the function of these positive interactions.

**Table 1:** Adults' positive behaviour

Code	% of positive action
Agree joint action	4%
Discuss image content	4%
Discuss tag content	12%
Discuss task	4%
Give opinion to member	8%
Playful behaviour	28%
Request opinion from member	4%
Synchronise action	28%
Verbal opinion of image	8%

Of the adult only sessions, 70% featured laughter and playful comments, these included reactions to another participant deleting a newly created tag, or commenting on the content of a tag. Consequently for the adults, the creation of a tag, or modifying a group member's tag was often perceived as a playful action. 60% of the adult's sessions also featured an attempt by at least one of the participants to synchronise their actions with the group (i.e. not clicking *Next* until others were ready to move to the next image / vote).



**Figure 8:** Image and associative tags

The discussions about particular images tended to consist of short utterances such as "Oh, I like that one. Do you?." These discussions showed a superficial deconstruction of the image, rather than a detailed personal response to the image or artefact's qualities. The tags created by the adults were of a similar quality. Simple descriptive words naming the object, its shape and origin were the most common. Fig. 8, show a typical example of the tags generated during the trial. Of the 409 images viewed, the log showed that less than 5% of the tags expressed a personal opinion – i.e. "cute shoes"

**Table 2:** Adult's negative behaviour

Code	% negative behaviour
No response to comment	29%
No verbal discussion	52%
Not synchronising action	19%

Although the groups were familiar, in 40% of the adult only sessions observed, there was no verbal discussion. There were verbal comments during these sessions, but no response from other members. Indicating that they had either not heard the utterance, to choose to ignore it.

There was a difference between the behaviour observed and the participants' report of the task and system. Although the adults were only seen to conduct short conversations, 56% of the participants reported feeling as if they had a full discussion, while 23% reported that they did not (21% did not comment). The participants stated that they were able to express a preference and had an awareness of other's actions - 85% of participants found seeing others' preferences helpful, while 73% reported viewing other's tags as beneficial. Only 13% of participants reported being unaware of others' actions whilst using the system.

The awareness of other's actions appeared also to have had an impact on individual group members decision making, with 42% reporting changing their vote as a consequence of seeing other's preferences and tags. There was less direct modification of other's content. Though some adults did playfully delete each other's tags, only 41% reported actively editing their group's contribution.

The log data showed that 71% of groups added images to the collection, again though this shows a majority it was surprising that this figure was not higher as this was the overall objective of the task. Of 409 images viewed across the 92 sessions, 205 images were voted to be kept. This approximation of 1 in 2 images to be kept appeared to be based on independent actions, rather than a result of an agreement within the group. Prior to testing, due to need to vote, there was an expectation the participants in each group would be motivated to reach a collective decision, to be assured that the image they wanted would be saved to the collection. However, there was only one session where an adult couple agreed to synchronise their actions before casting their vote. In all other sessions - though opinions were expressed and requested - there was no observable lobbying for votes, persuasive language or bargaining. This lack of data suggested that the participants either failed to understand the collaborative intent of the task, or thought it unnecessary to reach a consensus.

After using WeCurate, the participants were asked to consider how the system contributed to the experience of visiting the museum. The comments left by the participants were categorised, Table 3 shows a breakdown of these opinions.

**Table 3:** Impact to museum experience

Code	% of comments
Add to experience	15%
Focus discussion	2%
Focus attention on exhibits	19%
More involved in museum	2%
Good interactivity for children	4%
Awareness of other's opinion	2%
Lack of purposefulness	4%
Better outside of the museum	4%
Did not add to the experience	6%
No comment	42%

Overall 44% thought it was a positive, only 14% claimed it was negative. However, the remaining 42% did not comment, which at best suggests a neutrality, but it is also possible they did not warm to the system enough to find a positive comment.

The ebb and flow of the museum's visitors did mean that during the evaluation we were either extremely busy, or very quiet. The bulk of the museum's visitors arrived between 11am and 1pm, these consisted largely of young families. School groups arrived throughout the day, but in very large groups, and were often at the museum for specific activities, with preset tasks to complete. As there were not enough devices for the whole group, and as the group were time pressured, their teachers/supervisors would not allow the children to use the system. Consequently we were unable to evaluate this very prominent audience.

## 6. CONCLUSION

The results showed the participants felt they were able to express opinions about the image. In terms of a shared experience, there was evidence they were aware of the opinions of others via the interface, and further that this awareness impacted their own decision making. The autonomous agents' were effective in managing the group's decision-making processes. The results also showed a high degree of playful behaviour among the participants, particularly the adults.

It became apparent that the dynamics of interaction varied widely between different social groups. There were clear patterns in parent-child interactions. The data adds further weight to parents' role in mediating children's deconstruction of cultural artefacts via a process of inquiry and modelling.

A multiuser approach to supporting parent-child dyads should acknowledge it is likely that they will share a single device so the activity can be micromanaged. This suggests that rather than multiple points of interaction to accommodate parent-child dyads, there is more millage in developing activities which acknowledges joint interaction. For the children, it is clear that the technology is very compelling. Even if they do not understand the task, and understanding is beyond their comprehension, they will engage.

The adult's behaviour was more varied than the parent-child dyad. They were more likely to work independently, but also more disruptive with other groups members.

The lack of discussion between the adult participants, and the parent-child dyads in groups was a concern. They were obviously too absorbed in their individual interaction, which negatively impacted their social interaction. Although the group were asked to reach a collective decision, this was not something they actively sought. Future development needs to consider activities that generate more cohesion. However, despite the lack of observed social interaction, there does appear to be communication via the shared environment. As group members had an awareness of others' actions, perhaps there was less need for verbal interaction.

It was disappointing that older adults were absent from the evaluation, and that the participants' opinion of the impact of WeCurate on the museum experience was not overwhelming positive. Without question, there are aspects of the design that could improve the quality of the experience, but the answer may lie in the expectations and motivations of this audience. The Horniman is quite traditional, and has been cautious about placing too many interactives in the museum space. Visitors may choose this museum because of these qualities, and prefer less technology-centric displays.

The activity of tagging produced some mixed results. On the surface, prior to testing, asking the participant to think of words associated with the image made sense. After the evaluation, the low quality and diversity of the tags produced, raised questions about the value of this activity for our system. The participants did verbally comment on the tags they created, but the tags were rarely a

product of a conversation. As with the discussions, we had expected the tags to be more extensive.

For the next phase of our design, it is clear that some support in deconstructing visual media may be beneficial, and that activities should be structured to suit the specific needs of the different social groups. This is not without its complications, as interactivity and engagement should not be discriminatory. To support a more in depth deconstruction, it may be worth taking a lead from the parents by incorporating features in the system which prompts the visitor to consider meaningful aspects of the image. Rather than providing information, the system should be active in provoking and guiding attention to reveal the qualities of the artefact.

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## 8. REFERENCES

- Allen, S. and Gutwill, J. (2004) Designing Science Museum Exhibits with Multiple Interactive Features: Five Common Pitfalls. *Curator: The Museum Journal*. 47(2), 199–212.
- Ash, D. (2002) Negotiations of thematic conversations about biology. *Learning conversations in museums*, 357–400.
- Biocca, F., and Nowak, K. (2001) Plugging your body into the telecommunication system: Mediated embodiment, media interfaces, and social virtual environments. *Communication technology and society*, 407–447.
- Boehner, K., Thom-santelli, J., Zoss, A., Gay, G., Hall, J., and Barrett, T. (2005) Imprints of place: Creative expressions of the museum experience. In CHI EA '05 CHI '05 Extended Abstracts on Human Factors in Computing Systems, 1220–1223.
- Cosley, D., Lewenstein, J., Herman, A., Holloway, J., Baxer, J., Nomura, S., Boehner, K., and Gay, G. (2008) Artlinks: Fostering social awareness and reflection in museums. In SIGCHI Conference on Human Factors in Computing Systems, 403–412.
- Cosley, D., Baxer, J., Lee, S., Alson, B., Nomura, S., Sarabu, C., and Gay, G. (2009) A tag in the hand: Supporting semantic, social, and spatial navigation in museum. In SIGCHI Conference on Human Factors in Computing Systems, 1953–1962.
- Ellenbogen, K., Luke, J., and Dierking, L. (2004) Family learning research in museums: An emerging disciplinary matrix? *Science Education* 88.

- Erickson, T. (2003) Designing visualizations of social activity: six claims. In CHI'03 extended abstracts on Human factors in computing systems, vol. 5, 846–847.
- Glaser, B. (2008) *Doing Quantitative Grounded Theory*. Sociology Press.
- Golder, S. and Huberman, B.A. (2006) Usage Patterns of Collaborative Tagging Systems. *Journal of Information Science*, 32(2). 198-208.
- Heath, C., vom Lehn, D. and Osborne, J. (2005) Interaction and interactives: collaboration and participation with computer-based exhibits. *Public Understanding of Science* 14, 1 (2005) 91-101
- Hindmarsh, J., Heath, C., Vom Lehn, D., and Cleverly, J. (2005) Creating assemblies in public environments: Social interaction, interactive exhibits and cscw. *CSCW* 14, 1–41.
- Hope, T., Nakamura, Y., Takahashi, T., Nobayashi, A., Fukuoka, S., Hamasaki, M. and Nishimura, T. (2009). Familial collaborations in a museum. In CHI '09 Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 1963-1972
- Hornecker, E. and Stifter, M. (2006) Learning from Interactive Museum Installations About Interaction Design for Public Settings. In Proceedings of the 2006 Australasian Computer-Human Interaction Conference, OZCHI 2006, Sydney, Australia
- Krause, M. and Aras, H. (2009) Playful tagging: folksonomy generation using online games, 1207-1208. In WWW '09 Proceedings of the 18th international conference on World wide web.
- Looseley, R. and Roberto, F. (2009) Museums & Wikis: Two Case Studies. In Trant, J. and Bearman, D. (eds), *Museums and the Web 2009: Proceedings*. Archives & Museum Informatics, Toronto.
- Sanford, C., Knutson, K., and Crowley, K. (2007) We always spend time together on sundays: How grandparents and their grandchildren think about and use informal learning spaces. *Visitor studies* 10, 2, 136–151.
- Shtulman, A. and Checa, C. (2012) Parent-child conversations about evolution in the context of an interactive museum display. *International Electronic Journal of Elementary Education*, 5.
- Stylianou-Lambert, T. and Stylianou, E. (2010) A third space: reconsidering issues of neutrality and accessibility in the virtual art museum. In Seal, A., Bowen, J.P. & Ng, K. (eds.) *Proc of EVA2010*, 66–71.
- Tso-Sutter, K.H.L., Marinho L.B. and Schmidt-Thieme, L. (2008) Tag-aware Recommender Systems by Fusion of Collaborative Filtering Algorithms.
- Walker, K. (2008) Structuring Visitor Participation. In Tallon, L., and Walker, K. (eds.) *Digital Technologies and the Museum Experience. Handheld Guides and Other Media*. Altamira Press, 2008.
- Yee-King, M., Confalonieri, R., de Jonge, D., Hazelden, K., Amgoud, L., Sierra, C., Osman, N., and d'Inverno, M. (2013) Multiuser museum interactives for shared cultural experiences: an agent-based approach. In *ACM AAMAS-2013*. To appear.