Supplementary Material:
How Do People Edit Light Fields?

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Contents

The supplementary material includes:

- The present document.
- A Supplementary Video showing the following:
  - A short tutorial on the use of the editing environment.
  - Four editing sessions performed by artists on various real light fields.
  - More results displaying advanced edits.
- Additional materials including:
  - Code, incluying light field datasets.
  - Data, incluying analysis data and users' responses.
  - Additional videos, showing editing processes by users during tasks.

This document includes the following sections:

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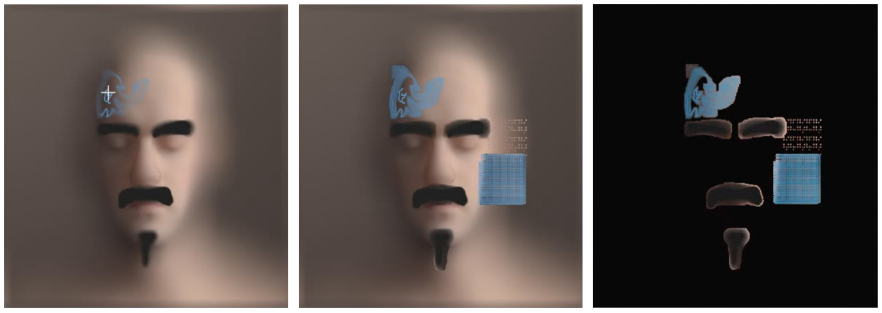


Figure S.1: *Screenshot of the interfaces based on the focus paradigm. Left: View in W1. Middle: "Standard" view in W2. Right: View in W2 when erasing. To highlight the edits, we do not display the light field in the second window when erasing in this interface.*

A Interface Implementation Details

We use screen-space rendering in OpenGL to display both the light field and the edits, using two simple GLSL shaders, one for each interaction paradigm (*multiview* and *focus*). The light field and the edits are stored in different 2D textures. These textures store an array of images where each image represents one different view of the light field. The two textures are blended together in rendering time. Strokes are rendered directly on the edits' texture, used as a render target, with a different GLSL shader for each tool.

Depth information is stored as a disparity map, and is computed from the light field depth map and the camera properties (i.e. number of views, focal distance, FOV and distance between cameras) using the code shown in Listing 1. This disparity map is stored for each view. Storing depth (disparity) information as a map, instead of computing it on-the-fly using e.g. ray casting introduces the problem of quantization, which may lead to small errors due to quantization; nevertheless, these are not statistically significant. We opt for this approach due to its efficiency, to ensure real-time frame rates.

In the second screen *W2* in interfaces based on focus, the edits are not blended with the light field; it is thus used by users mainly when erasing edits. To help them in this process, and based on pilot tests, we do not display the light field in this second screen when erasing, but only the edits (strokes, or pasted images). Figure S.1 shows the view on W1, the "standard" view in W2, and the view in W2 when erasing.

A pilot test showed us that users assume that highlights lie on the surface of the object. In consequence, in Task S3, which requires changing the specular highlights of a *fertility* figurine, we measure error with respect to the surface of the object, in order to provide a more fair comparison between interfaces with and without depth.

Listing 1: *Source code of the function used to obtain disparity from the depth map and the light field camera properties.*

```
function [ disp ] = depth_to_disparity( depth, size_image,
                nbviews, radius, focaldistance, fov )

        imgsize = tan(fov*pi/180/2)*2*focaldistance;
        pix_size = imgsize / size_image;
        du = radius / floor(nbviews/2);

        disp = -(depth-focaldistance) ./ (depth)
                .* (du/pix_size) + 1;

end;
```

B Description of Tasks

B.1 Experiment 1: Synthetic Scenarios

We include here the description given to the users for each *directed* task, while Table 1 compiles the task description, task challenge, and central views of the input light field and target image. For open tasks (S6 and S7), target images are given to the users only as a source of inspiration.

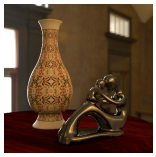
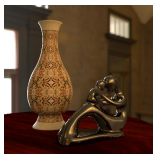
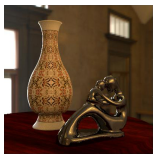
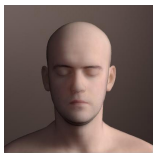
Task Code	Input Central View	Target Central View	Task Description	Task Challenge
S1			Draw initial on wall.	Paint planar geometry parallel to camera plane.
S2			Change the color of the pattern in the vase.	Paint on a curved surface.
S3			Dodge specular highlights in *fertility* figurine.	Modify specular highlights on a curved surface.
S4			Place paper airplane between the vase and the *fertility* figurine.	Place billboard-like object in free space.
S5			Draw a heart on the wall, behind the railing.	Place billboard-like object in free space.
S6			Freely edit the *Head* light field.	Edit a light field with abundant curved surfaces and a very large baseline.
S7			Freely edit the *San Miguel* light field.	Edit a light field with several planar surfaces, parallel and slanted, at very different depths.

Table 1: *Description of tasks in Experiment 1. See accompanying text for the exact instructions given to users.*

Task S1 *Draw your initial on the back blue wall approximately in the place indicated in the sample image. Use the brush (and the erase tool if necessary). Do not worry about the color of the brush. Time: 5 minutes.*

Task S2 *Using the brush (and the erase tool if necessary), paint on the pattern of the vase as shown in the sample image to change the color of that part of the vase. Do not worry about the color of the brush. Time: 5 minutes.*

Task S3 *Using the dodge tool (and the erase tool if necessary), increase the brightness of the specular highlights in the glossy statue of the image. Change only the specular highlights indicated in the sample image. Time: 5 minutes.*

Task S4 *Once you press Start, an image will appear joined to the cursor. You have to place that image in the scene, so that to appears to be floating in the air. The image needs to be placed such that in depth it is situated in front of the vase, but behind the glossy statue (see sample image). Time: 5 minutes.*

Task S5 *Using the brush (and the erase tool if necessary) draw, on the back wall, a heart so that it is partially occluded by the railing (see sample image). The heart needs to be on the wall, and thus occluded by the foreground railing. Time: 5 minutes.*

Task S6 *In this task you can toggle depth information on/off at any point during the editing process. You are given a set of photos for inspiration. Suggestions: painting on the face, adding glasses, monocle, etc. Time: 12 minutes.*

Task S7 *You can now choose between any of the four interfaces you have tested so far, that is, focus with or without depth, and multiview with or without depth. You can switch between focus and multiview and activate or deactivate depth information at any point during the editing process. The goal is making the scene more beautiful. Suggestions: adding flowers to the plants (the billboard object to insert are now some flowers), decorating the flower pots, or any other edit you can think of. Time: 12 minutes.*

B.2 Experiment 2: Real Scenarios

We include here the description given to the users for each task. Tables 2 and 3 compile the task description, task challenge, and central views of the input light field and target image.

Task R1 *Colorize in green the arrows and time marks of the watch, as shown in the figure. Time: 10 minutes.*

Task R2 *Two different tasks: (a) Change the color ("Hue" brush) of the nose of the reindeer from brown to red; and (b) change the color ("Hue" brush) of the eyes of the crocodile from white to light yellow. Time: 10 minutes.*

Task R3 *Place two more street lights on the electric cable, as shown in the image. There is no need to care about the change of size with perspective. You can use the "Paste Img." tool. Time: 10 minutes.*

Task R4 *Change the color ("Hue" brush) of the large cube statue to dark red to simulate a change of material, as shown in the image. Note: The statue has some holes through which the wall of the building in the back is visible. Time: 10 minutes.*

Task R5 *Add ivy (using the "Texture" brush) to the wall of the building, as shown in the image. You should try to avoid having ivy on the tree in front of the building and on the pipe on the wall. Time: 10 minutes.*

Task R6 *Add flowers (use "Paste Img.") to the bush that is behind the railing, taking into account that they should not appear on top of the bars of the railing. Time: 10 minutes.*

Task R7 *Modify the exposure (you can use the "Dodge" brush) of the matrioska in the foreground to lighten it up, making it less dark. Time: 10 minutes.*

Task R8 *Add a SIGGRAPH logo (use "Paste Img.") to the spine of the reddish-brown book in the back, and change the color of the blue book (use the "Hue Brush") as shown in the image. Time: 10 minutes.*

Task R9 *Change the color of the logo in the teapot using the "Hue" brush. Time: 10 minutes.*

Task R10 *Change the color ("Hue" brush) of the yellow and blue flowers in the foreground to colors in the color range of the rest of the flowers (red, orange, maroon, pink), as shown in the image. Time: 10 minutes.*

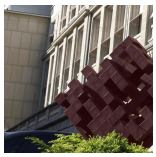
Task Code	Input Central View	Target Central View	Task Description	Task Challenge
R1			Colorize the arrows and the marks on the inner circumference of the watch.	Painting on a slanted surface with a noisy depth reconstruction. *Depth from Wanner and Goldlücke [2012].*
R2			Change the color of the reindeers nose and of the eyes of the crocodile.	Painting on a curved surface. *Depth from Kim et al. [2013].*
R3			Place another light on the cable.	Placing a billboard-like object in free space. *Depth from Kim et al. [2013].*
R4			Change the hue of the statue.	Dealing with selection and complex geometries. *Depth from Kim et al. [2013].*
R5			Add ivy to the wall, as shown in the image.	Dealing with occlusions and slanted surfaces. *Depth from Kim et al. [2013].*

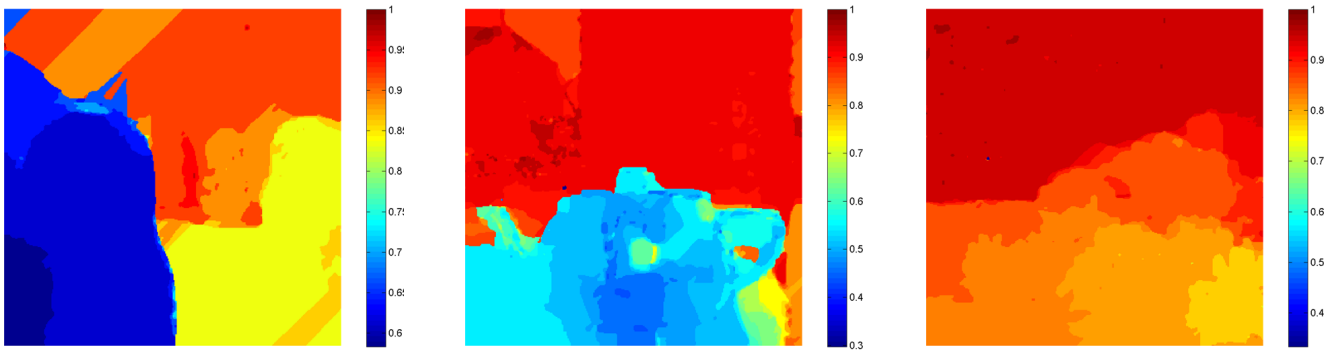
Table 2: *Description of tasks in Experiment 2 (1/2, continues in next page). See accompanying text for the exact instructions given to users.*

Task Code	Input Central View	Target Central View	Task Description	Task Challenge
R6			Add flowers to the bush (see target image for guidance).	Dealing with occlusions and working on areas of complex depth reconstruction. *Depth from Kim et al. [2013].*
R7			Use dodge to brighten-up the matrioska in the foreground.	Editing curved surfaces with a coarse depth reconstruction. *Depth from Lytro^{TM} [2013].*
R8			Change one of the books' color and paste a SIGGRAPH logo on a book.	Dealing with color selection and pasting onto an object parallel to the camera plane. *Depth from Lytro^{TM} [2013].*
R9			Change the RenderMan logo in the teapot to a purplish color.	Painting on a curved surface with a coarse depth reconstruction. *Depth from Lytro^{TM} [2013].*
R10			Change the colors of the two foremost flowers in the scene to match those of the rest of the flowers.	Dealing with selection of complex geometries. Using selection based on color and/or on depth. *Depth from Lytro^{TM} [2013].*

Table 3: *Description of tasks in Experiment 2 (2/2). See accompanying text for the exact instructions given to users.*

C Depth Information in Real Light Fields

We show in this section, in Figure S.2, for the light fields used in our tasks, the Lytro light fields' reconstructed depth maps. Reconstructed depth for the light fields from Wanner and Goldlücke [2012] and from Kim et al. [2013] can be found in their respective, publicly available databases.



matrioska *lab* *frog*

Figure S.2: *Depth maps from Lytro light fields (central view) used in the tasks of our second experiment (depth values are relative).*

D Additional Data from Analysis of Experiment 1 (Synthetic Scenarios)

D.1 Additional Information on Experimental Procedure

The study consisted of two main blocks: *multiview* and *focus*, in randomized order for each user. Within each block, the two versions of the interface were used (with and without depth), also in randomized order to compensate for possible learning effects. This yielded a total of four sessions, with each one including all five tasks sequentially (S1 to S5). After each block, subjects were asked to complete Task S6 with the current interaction paradigm. After completing both blocks, subjects additionally performed the final Task S7. We recorded the screen during all the experiments.

After finishing a session with an interface or an open task, users had to fill in a questionnaire and could write free-form comments as well. At the end, subjects were required to fill in a final questionnaire where they had to rate and rank interfaces per task, and also regarding other more general aspects. All questionnaires can be found in the supplementary material. Each participant completed the experiment with an informal interview, to collect general impressions and ask about the subject's workflow.

Although the participants were recommended to use a pen on a tablet, they were allowed to use a mouse if they felt more comfortable using it, to ensure that their performance was not affected by the input device. The full experiment took around four hours per subject, including training and short breaks. The training took around one hour, including filling in a preliminary questionnaire, and was performed with an additional light field, shown in the supplementary material.

D.2 Error in Depth

Figure 5 (top) in the main text shows the per interface mean error in each of the directed tasks (S1–S5). Tasks S1 to S3 required drawing strokes onto non-occluded surfaces. *M* yielded a higher error ($p \leq 0.018$) than *F* ($p \leq 0.018$), showing that users found it more difficult to locate an edit in depth. In these tasks, when interfaces with depth (*MD* and *FD*) are used the error in depth is zero, since strokes directly snap to the surface.

In Task S4, which requires positioning in free space, the trend is reversed: interfaces without depth yield lower errors. An interesting finding is that neither the difference between *M* and *F* nor between interfaces with depth (*MD* and *FD*) is significant. Task S5 is possibly the most complex, since it requires handling occlusions and large depth discontinuities. *F* yields the lowest error, while *M* yields the highest.

Here, Table 4 shows pairwise comparisons (p-value) for the error in depth of each of the five *directed* tasks [S1..S5]. For the results of the ANOVA see also Table 1 in the main text. A p-value ≤ 0.05 (marked with a star (*)) indicates the difference between interfaces is significant. Additionally, in Figure S.3 we plot 95% confidence intervals for the difference of the mean between each pair of interfaces. Confidence intervals also show significance (if the interval contains zero, then the difference between the compared interfaces is not significant), but additionally they give an idea of the magnitude of the difference. Since confidence intervals are symmetric for each pair of interfaces (e.g. between $M - F$ and $F - M$ only the sign of the interval changes) we only show half of the pairwise comparisons.

D.3 Time to Completion

We plot mean times to completion per interface for each directed task (S1–S5) in Figure S.4, and also illustrate in it statistically significant differences between them. For tasks S1 to S3, which require placing strokes on surfaces, interfaces with depth information (*MD* and *FD*) took less time, although the difference is only significant with respect to *M* ($p \leq 0.008$). There is no significant differences in Task S1, due to its simplicity.

Task S4 yields very low times in general, while it was the one with the highest errors. This is interesting, since it is the only task that specifically demands positioning in free space rather than on a surface. For *MD* and *FD*, this

Table 4: *Significance of pairwise comparisons for error in depth in directed tasks.*

a *Task S1*

	M	***MD***	***F***	***FD***
M	-	0.000*	0.018*	0.000*
MD	0.000*	-	0.000*	-
F	0.018*	0.000*	-	0.000*
FD	0.000*	-	0.000*	-

b *Task S2*

	M	***MD***	***F***	***FD***
M	-	0.000*	0.000*	0.000*
MD	0.000*	-	0.000*	-
F	0.000*	0.000*	-	0.000*
FD	0.000*	-	0.000*	-

c *Task S3*

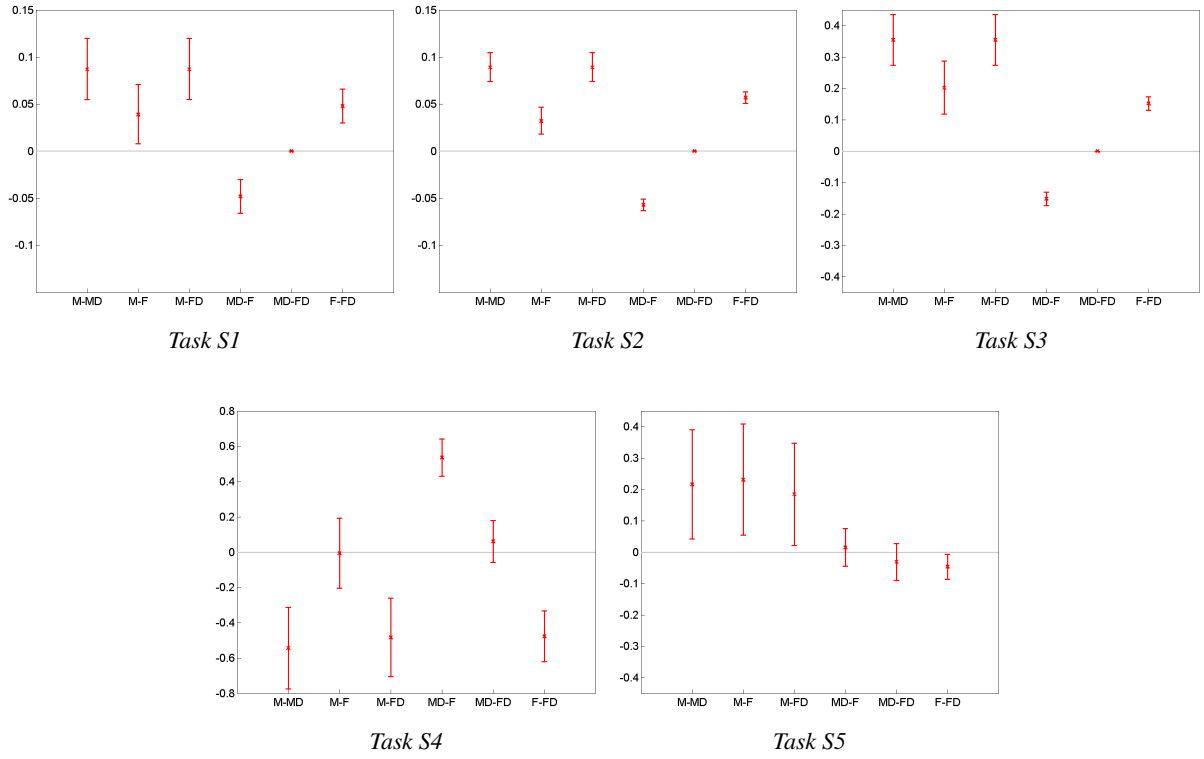
	M	***MD***	***F***	***FD***
M	-	0.000*	0.000*	0.000*
MD	0.000*	-	0.000*	-
F	0.000*	0.000*	-	0.000*
FD	0.000*	-	0.000*	-

d *Task S4*

	M	***MD***	***F***	***FD***
M	-	0.000*	0.951	0.000*
MD	0.000*	-	0.000*	0.296
F	0.951	0.000*	-	0.000*
FD	0.000*	0.296	0.000*	-

e *Task S5*

	M	***MD***	***F***	***FD***
M	-	0.018*	0.014*	0.028*
MD	0.018*	-	0.606	0.285
F	0.014*	0.606	-	0.024*
FD	0.028*	0.285	0.024*	-



Task S1 *Task S2* *Task S3*

Task S4 *Task S5*

Figure S.3: *Confidence intervals at 95% for mean difference of error in depth between interfaces for Tasks 1 to 5.*

is likely due to users realizing that those interfaces are not appropriate for this task and just giving up quickly. This hypothesis seems supported by the low ratings these two interfaces received in this task (Figure S.6). However, in

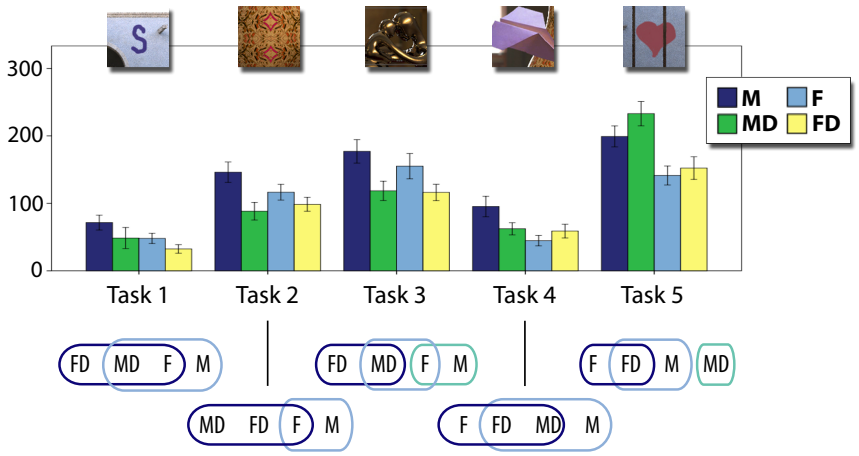


Figure S.4: *Top: Mean time to completion per interface for each task. Bottom: Pairwise comparisons for the time to completion in each task. Items in the same set are statistically indistinguishable.*

general, results in this task suggest the difficulty of users to correctly judge depth in free space, using any of the four interfaces: they simply place the billboard at some reasonable point in the scene, occluding the vase. These behaviors would also explain the high errors reported in the previous subsection. A closer analysis reveals that *F* takes the least time, although the difference is only significant with respect to *M* ($p \leq 0.008$).

Task S5 requires dealing with occlusions. Based on time data, *MD* seems not to be a useful interface, to the point that some subjects did not complete the task in the given time (in particular eight of the subjects, seven of them with the *MD* interface). This is because handling occlusions in *MD* requires erasing occluded parts in various different views, which is time consuming.

We additionally provide here, in Table 5, the results of the repeated measures ANOVA performed on the time to completion, from which the main text only reports significant differences. The table contains the H-test, the between-groups degrees of freedom df_1 (three unless the Greenhouse-Geisser correction is applied because sphericity is violated), the within-groups degrees of freedom df_2, the associated p-value, and the value of the partial eta-squared η^2 for each task, indicative of the proportion of variance that can be attributed to the *interface* factor. Table 6 contains the pairwise comparisons (p-value) for the time to completion in each of the five *directed* tasks [S1..S5]. A p-value ≤ 0.05 (marked with *) indicates significant difference. Additionally, in Figure S.5 we plot 95% confidence intervals for the difference of the mean between each pair of interfaces (see Section D.2 for details on confidence intervals).

Table 5: *ANOVA results for time to completion in directed tasks.*

	S1	***S2***	***S3***	***S4***	***S5***
H	2.048	6.730	5.431	3.986	9.175
(df_1, df_2)	(2.080,35.364)	(3,54)	(1.815,32.669)	(3,48)	(3,54)
p	0.142	0.001*	0.011*	0.013*	0.000*
η^2 (%)	10.8	27.2	23.2	19.9	33.8

D.4 Ratings

Users were asked to rate their preferences in *directed* tasks (S1..S5), overall preference, and general aspects on a scale [1..5] (for the exact questions see Section G). Mean ratings for directed tasks and for overall preference can be found in Figure S.6, while in Figure S.7 we show the mean values for the questions on general aspects, as well as

Table 6: *Significance of pairwise comparisons for time to completion in directed tasks.*

a *Task S1*

	M	***MD***	***F***	***FD***
M	-	0.293	0.104	0.007*
MD	0.293	-	0.977	0.367
F	0.104	0.977	-	0.115
FD	0.007*	0.367	0.115	-

b *Task S2*

	M	***MD***	***F***	***FD***
M	-	0.001*	0.093	0.006*
MD	0.001*	-	0.061	0.402
F	0.093	0.061	-	0.062
FD	0.006*	0.402	0.062	-

c *Task S3*

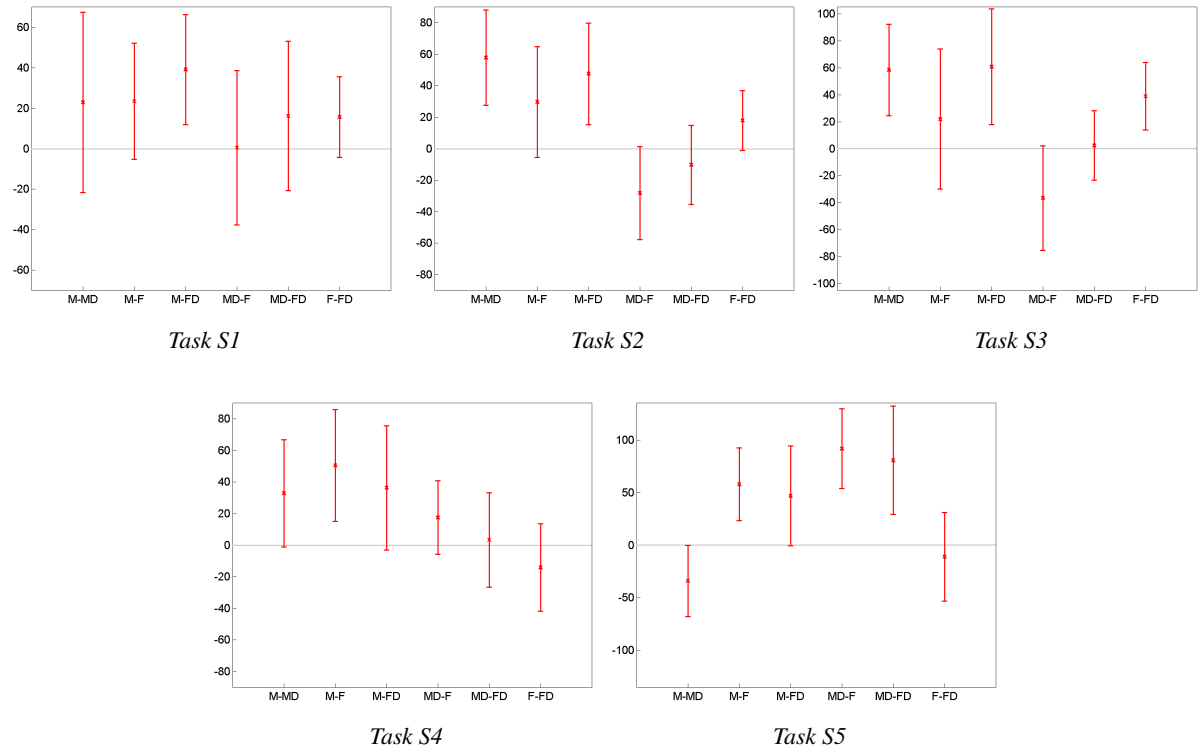
	M	***MD***	***F***	***FD***
M	-	0.002*	0.386	0.008*
MD	0.002*	-	0.063	0.850
F	0.386	0.063	-	0.004*
FD	0.008*	0.850	0.004*	-

d *Task S4*

	M	***MD***	***F***	***FD***
M	-	0.056	0.008*	0.068
MD	0.056	-	0.131	0.814
F	0.008*	0.131	-	0.294
FD	0.068	0.814	0.294	-

e *Task S5*

	M	***MD***	***F***	***FD***
M	-	0.050*	0.003*	0.052
MD	0.050*	-	0.000*	0.004*
F	0.003*	0.000*	-	0.590
FD	0.052	0.004*	0.590	-



Task S1 *Task S2* *Task S3*

Task S4 *Task S5*

Figure S.5: *Confidence intervals at 95% for mean difference in time to completion between interfaces for Tasks S1 to S5.*

the results of the pairwise comparisons between interfaces (for both ratings and rankings for comparison purposes).

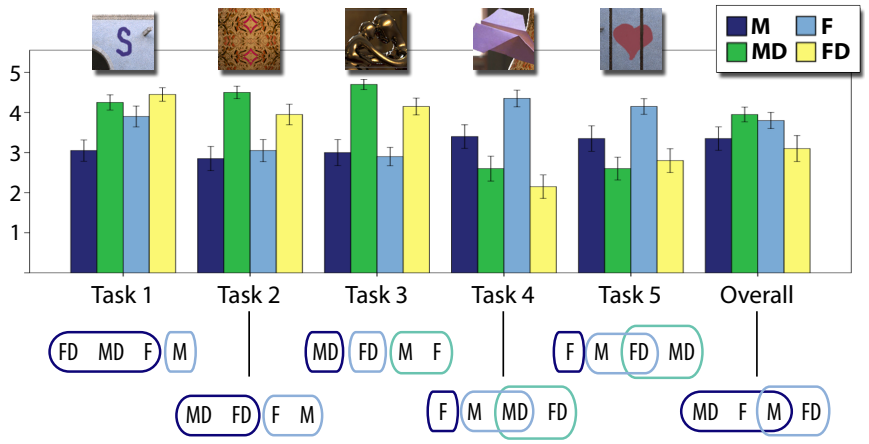


Figure S.6: *Top: Mean ratings from final questionnaire for questions on preference for each task and overall preference. Bottom: Pairwise comparisons between interfaces for the ratings. Items in the same set are statistically indistinguishable.*

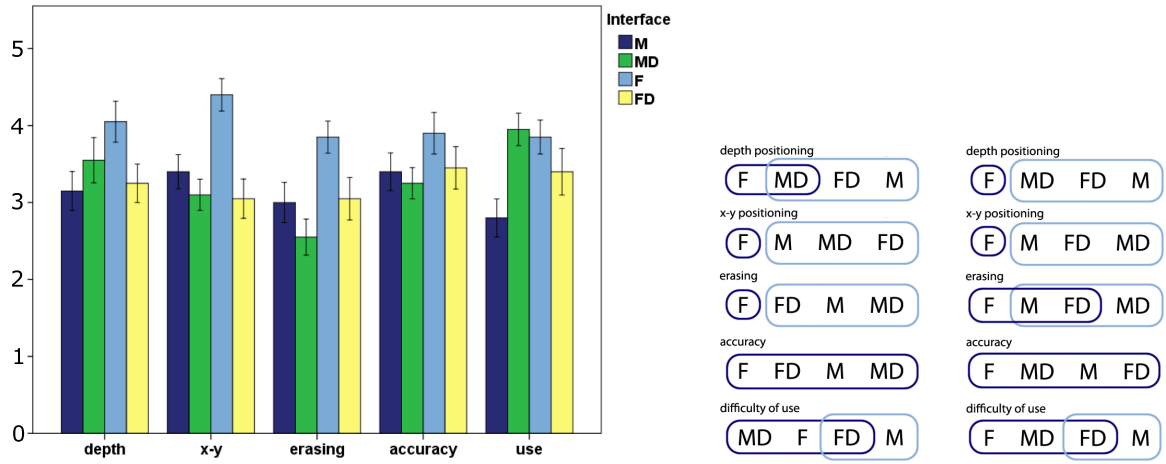


Figure S.7: *From left to right, for final questions on general aspects: mean ratings for each interface; ratings ordered by mean; and rankings ordered by rank product. Groupings show significant differences between interfaces.*

Next we provide the results of the repeated measures ANOVA performed on the ratings, from which the main text only reports which differences between interfaces are significant. Table 7 provides the H-test, degrees of freedom, and its associated significance p. The between-groups degrees of freedom are three in all cases, since we have four interfaces and sphericity can be assumed, while the within-group degrees of freedom are 57 in all cases. Additionally, we include the partial eta-squared η^2 for each case, and the significance results (p-value) of the pairwise comparisons in Table 8 (we found no significant difference for *accuracy*, see Table 7). A p-value ≤ 0.05 (marked with *) indicates the difference between interfaces is significant.

Table 7: *ANOVA results for ratings in final questionnaire.*

	S1	***S2***	***S3***	***S4***	***S5***	***overall***	***depth***	***x-y***	***erasing***	***accuracy***	***difficulty***
H(3,57)	7.410	9.251	13.203	12.390	6.218	2.217	2.053	8.456	4.180	1.119	3.943
p	0.000*	0.000*	0.000*	0.000*	0.001*	0.096	0.117	0.000*	0.010*	0.349	0.013*
η^2 *(%)*	28.1	32.7	41.0	39.5	24.7	10.4	9.8	30.8	18.0	5.6	17.2

Table 8: *Significance of pairwise comparisons for ratings in final questionnaire.*

a *Task S1*

	M	***MD***	***F***	***FD***
M	-	0.000*	0.025*	0.001*
MD	0.000*	-	0.384	0.494
F	0.025*	0.384	-	0.053
FD	0.001*	0.494	0.053	-

b *Task S2*

	M	***MD***	***F***	***FD***
M	-	0.000*	0.541	0.019*
MD	0.000*	-	0.001*	0.077
F	0.541	0.001*	-	0.016*
FD	0.019*	0.077	0.016*	-

c *Task S3*

	M	***MD***	***F***	***FD***
M	-	0.000*	0.815	0.014*
MD	0.000*	-	0.000*	0.045*
F	0.815	0.000*	-	0.000*
FD	0.014*	0.045*	0.000*	-

d *Task S4*

	M	***MD***	***F***	***FD***
M	-	0.053	0.026*	0.014*
MD	0.053	-	0.000*	0.107
F	0.026*	0.000*	-	0.000*
FD	0.014*	0.107	0.000*	-

e *Task S5*

	M	***MD***	***F***	***FD***
M	-	0.036*	0.035*	0.270
MD	0.036*	-	0.001*	0.618
F	0.035*	0.001*	-	0.002*
FD	0.270	0.618	0.002*	-

f *Overall*

	M	***MD***	***F***	***FD***
M	-	0.131	0.275	0.566
MD	0.131	-	0.614	0.047*
F	0.275	0.614	-	0.044*
FD	0.566	0.047*	0.044*	-

g *Depth Positioning*

	M	***MD***	***F***	***FD***
M	-	0.338	0.041*	0.823
MD	0.338	-	0.220	0.410
F	0.041*	0.220	-	0.049*
FD	0.823	0.410	0.049*	-

h *x-y Positioning*

	M	***MD***	***F***	***FD***
M	-	0.316	0.001*	0.309
MD	0.316	-	0.001*	0.871
F	0.001*	0.001*	-	0.000*
FD	0.309	0.871	0.000*	-

i *Erasing*

	M	***MD***	***F***	***FD***
M	-	0.154	0.034*	0.910
MD	0.154	-	0.003*	0.234
F	0.034*	0.003*	-	0.022*
FD	0.910	0.234	0.022*	-

j *Difficulty of Use*

	M	***MD***	***F***	***FD***
M	-	0.002*	0.015*	0.219
MD	0.002*	-	0.785	0.102
F	0.015*	0.785	-	0.216
FD	0.219	0.102	0.216	-

D.5 Rankings

Similarly, users ranked preferences in directed tasks (S1..S5), overall preference, and general aspects. For the exact questions, see again Section G. Rankings for preferences in directed tasks and for overall preference can be found in the main text (Figure 6, while here in Figure S.8 we show the ranks for the questions on general aspects. Additionally, results of pairwise comparisons between interfaces for rankings on general aspects questions are shown in Figure S.7.

Users' preferences for the questions on general aspects (both in rankings and ratings, see Figure S.7, in addition to Figure S.8) show that *F* ranks first in most cases, with no significant difference among the others. When it comes to accuracy, agreement among users decreases, and differences turn out not significant. Overall, what we extract from this analysis is users' inclination towards the *focus without depth* interface. The high correlation between rankings and ratings is apparent.

We provide here as well the results of the Kruskal-Wallis test performed on the rankings, from which the main text only reports which differences between interfaces are significant. Table 9 provides the test statistic χ^2, its degrees

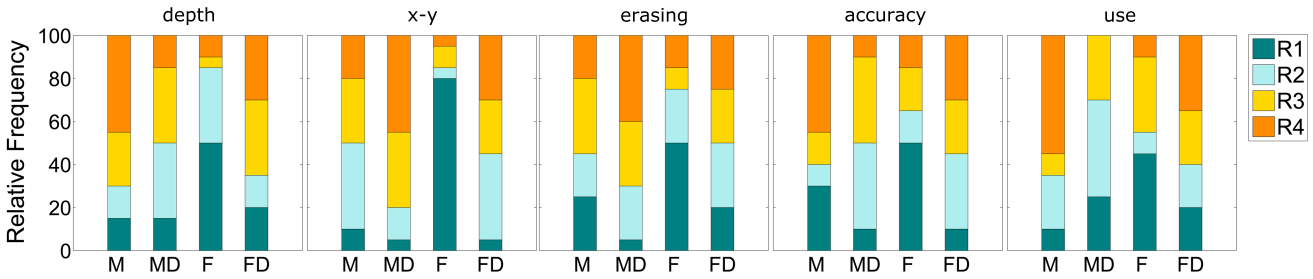


Figure S.8: *Rankings for each interface for questions on general aspects asked in final questionnaire.*

of freedom (three in all cases, since we have four interfaces) and its associated significance p. We also include the significance results of the pairwise comparisons in Table 10 (we found no significant difference for *accuracy*, see Table 9). A p-value ≤ 0.05 (marked *) indicates the difference between interfaces is significant.

For each ranking obtained in each question, we obtain the rank product per interface $\Psi(\vartheta)$ (see main text for details on computation). This rank product is used when sorting the interfaces according to the rankings received. In Table 11 we include all the rank products per interface per question, highlighting in bold the highest ranked.

Table 9: *Kruskal-Wallis results for rankings in final questionnaire.*

	S1	***S2***	***S3***	***S4***	***S5***	***overall***	***depth***	***x-y***	***erasing***	***accuracy***	***difficulty***
$\chi^2(3)$	26.149	14.931	35.313	22.357	11.455	9.006	13.825	28.440	10.507	5.925	12.403
p	0.000*	0.001*	0.000*	0.000*	0.008*	0.028*	0.002*	0.000*	0.014*	0.116	0.005*

D.6 Workflow in open tasks

Figure S.9 shows usage times for each interface and each of the open tasks, divided into the action being performed in each (drawing, erasing, changing the view or adjusting depth). The reader may refer to the supplementary videos (zip file, video on *Open tasks*) for sample editing sessions by subjects for these tasks.

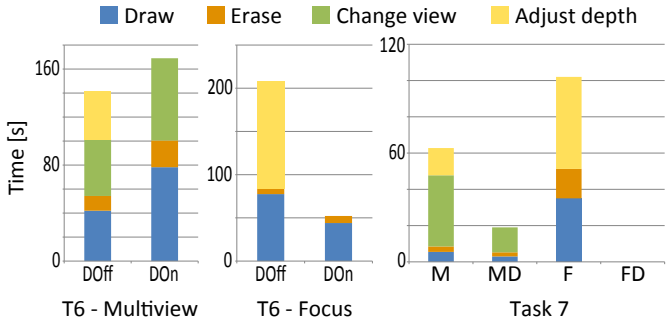


Figure S.9: *From left to right: Distribution of times for Task S6 using the multiview and focus paradigms, and for Task S7. Note that we do not take idle times into account. We plot median values, which makes FD in Task S7 become zero in all four categories.*

In Task S6, the times spent with and without depth for each interface are relatively balanced. This situation changes in Task S7, possibly as a consequence of the different nature of the light fields involved: the *head* in Task S6 is a large non-planar surface, where having depth information is highly useful, whereas *San Miguel* in Task S7 has many flat surfaces and larger depth discontinuities with free-space in between.

Nevertheless, the analysis of Task S7 reveals a clear general preference for interfaces without depth, and for *F* in

Table 10: *Significance of pairwise comparisons for rankings in final questionnaire.*

a *Task S1*

	M	***MD***	***F***	***FD***
M	-	0.000*	0.025*	0.000*
MD	0.000*	-	0.206	0.160
F	0.025*	0.206	-	0.008*
FD	0.000*	0.160	0.008*	-

b *Task S2*

	M	***MD***	***F***	***FD***
M	-	0.001*	0.673	0.011*
MD	0.001*	-	0.005*	0.482
F	0.673	0.005*	-	0.035*
FD	0.011*	0.482	0.035*	-

c *Task S3*

	M	***MD***	***F***	***FD***
M	-	0.000*	0.482	0.002*
MD	0.000*	-	0.000*	0.206
F	0.482	0.000*	-	0.000*
FD	0.002*	0.206	0.000*	-

d *Task S4*

	M	***MD***	***F***	***FD***
M	-	0.122	0.035*	0.025*
MD	0.122	-	0.000*	0.482
F	0.035*	0.000*	-	0.000*
FD	0.025*	0.482	0.000*	-

e *Task S5*

	M	***MD***	***F***	***FD***
M	-	0.122	0.122	0.261
MD	0.122	-	0.002*	0.673
F	0.122	0.002*	-	0.008*
FD	0.261	0.673	0.008*	-

f *Overall*

	M	***MD***	***F***	***FD***
M	-	0.011*	0.160	1.000
MD	0.011*	-	0.261	0.011*
F	0.160	0.261	-	0.160
FD	1.000	0.011*	0.160	-

g *Depth Positioning*

	M	***MD***	***F***	***FD***
M	-	0.160	0.000*	0.482
MD	0.160	-	0.035*	0.482
F	0.000*	0.035*	-	0.005*
FD	0.482	0.482	0.005*	-

h *x-y Positioning*

	M	***MD***	***F***	***FD***
M	-	0.092	0.001*	0.574
MD	0.092	-	0.000*	0.261
F	0.001*	0.000*	-	0.000*
FD	0.574	0.261	0.000*	-

i *Erasing*

	M	***MD***	***F***	***FD***
M	-	0.122	0.092	0.888
MD	0.122	-	0.001*	0.160
F	0.092	0.001*	-	0.068
FD	0.888	0.160	0.068	-

j *Difficulty of Use*

	M	***MD***	***F***	***FD***
M	-	0.003*	0.005*	0.325
MD	0.003*	-	0.888	0.049*
F	0.005*	0.888	-	0.068
FD	0.325	0.049*	0.068	-

Table 11: *Rank products per interface for rank scores on final questionnaire.*

	S1	***S2***	***S3***	***S4***	***S5***	***overall***	***depth***	***x-y***	***erasing***	***accuracy***	***difficulty***
M	3.37	2.85	2.90	2.16	2.17	2.59	2.72	2.42	2.23	2.36	2.85
MD	1.99	**1.66**	**1.39**	2.72	2.70	**1.71**	2.30	3.04	2.88	2.35	1.90
F	2.34	2.66	3.28	**1.37**	**1.64**	2.07	**1.55**	**1.24**	**1.63**	**1.70**	**1.81**
FD	**1.52**	1.90	1.81	2.98	2.49	2.62	2.47	2.63	2.29	2.54	2.46

particular. It can be seen how most of the pure editing operations are performed in *F*, while *M* is used mainly to change the view point. Users highlight the control over positioning that F gives them over the rest.

In Table 12 we show the number of times users switched from one interface to another in Task S7, in which they can freely switch between any of the four interfaces at any time. We show the sum for all subjects. Note that, due to how menus were implemented, users did not select one of four interfaces, but switched between *multiview*

and *focus* paradigms, and between depth on or off (there are eight possible interface switches). The high number of switches between M and F supports the findings reported in the main text: the preferred workflow was to edit mostly in *F*, then switch to *M* for visualization. To illustrate the workflow of users in this task, we include in Figures S.10, S.11 and S.12 timelines for each subject showing which interface the subject is using and what for (*drawing*, *erasing*, *changing view* or *adjusting depth*). In these figures, in some cases users appear to be *adjusting depth* while interfaces with depth (FD or MD) are activated: this is due to users accidentally touching the *adjusting depth* controls (mouse wheel or equivalent in tablet-pen device); when computing median times for Figure S.9 these spurious times were removed from the computation.

Table 12: *Switching between interfaces in Task S7.*

	F→M	***M→F***	***F→FD***	***FD→F***	***M→MD***	***MD→M***	***FD→MD***	***MD→FD***
$N_{switches}$	58	52	29	27	25	15	18	31

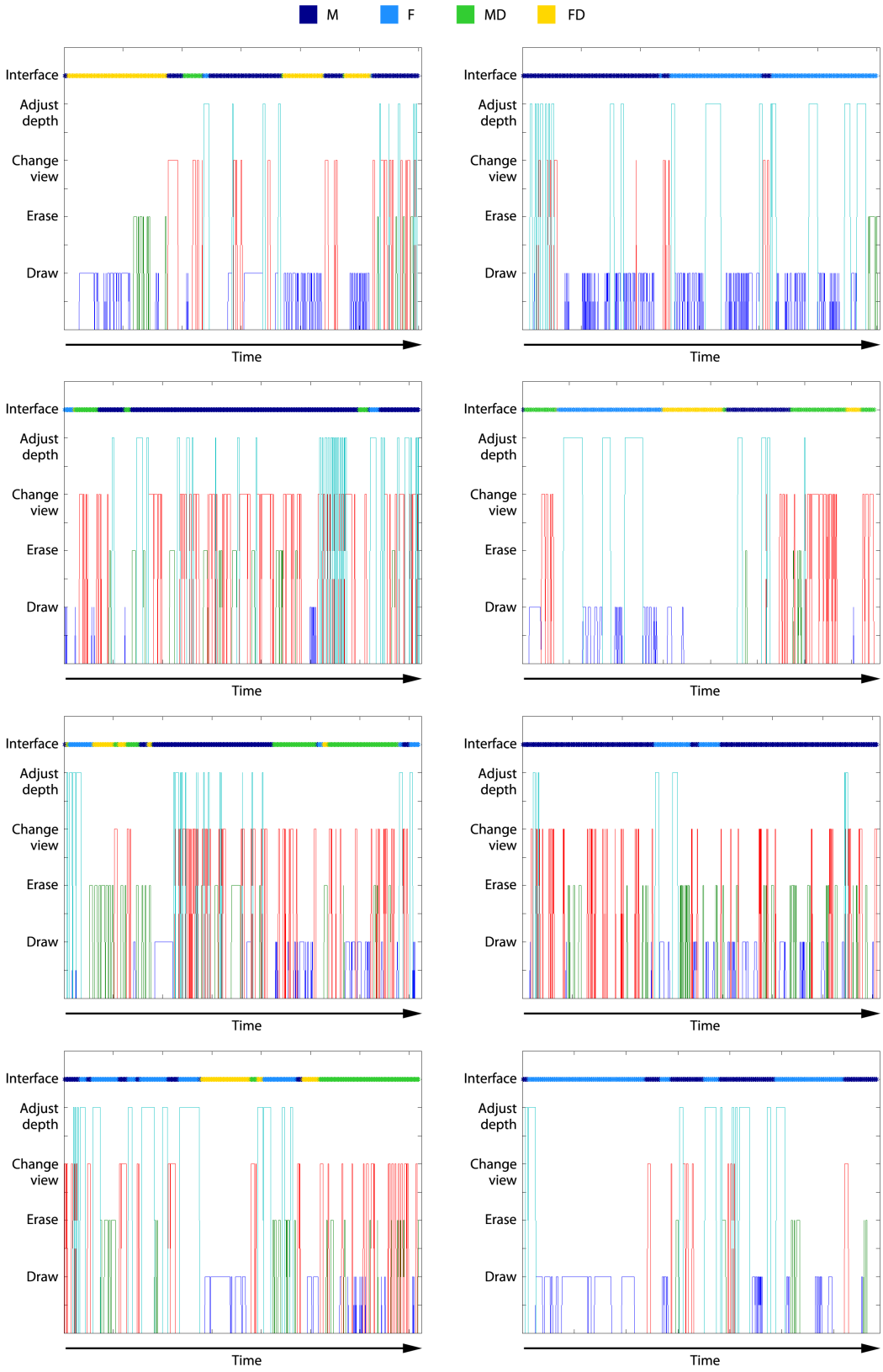


Figure S.10: *Workflow for Task S7, subjects 1-8.*

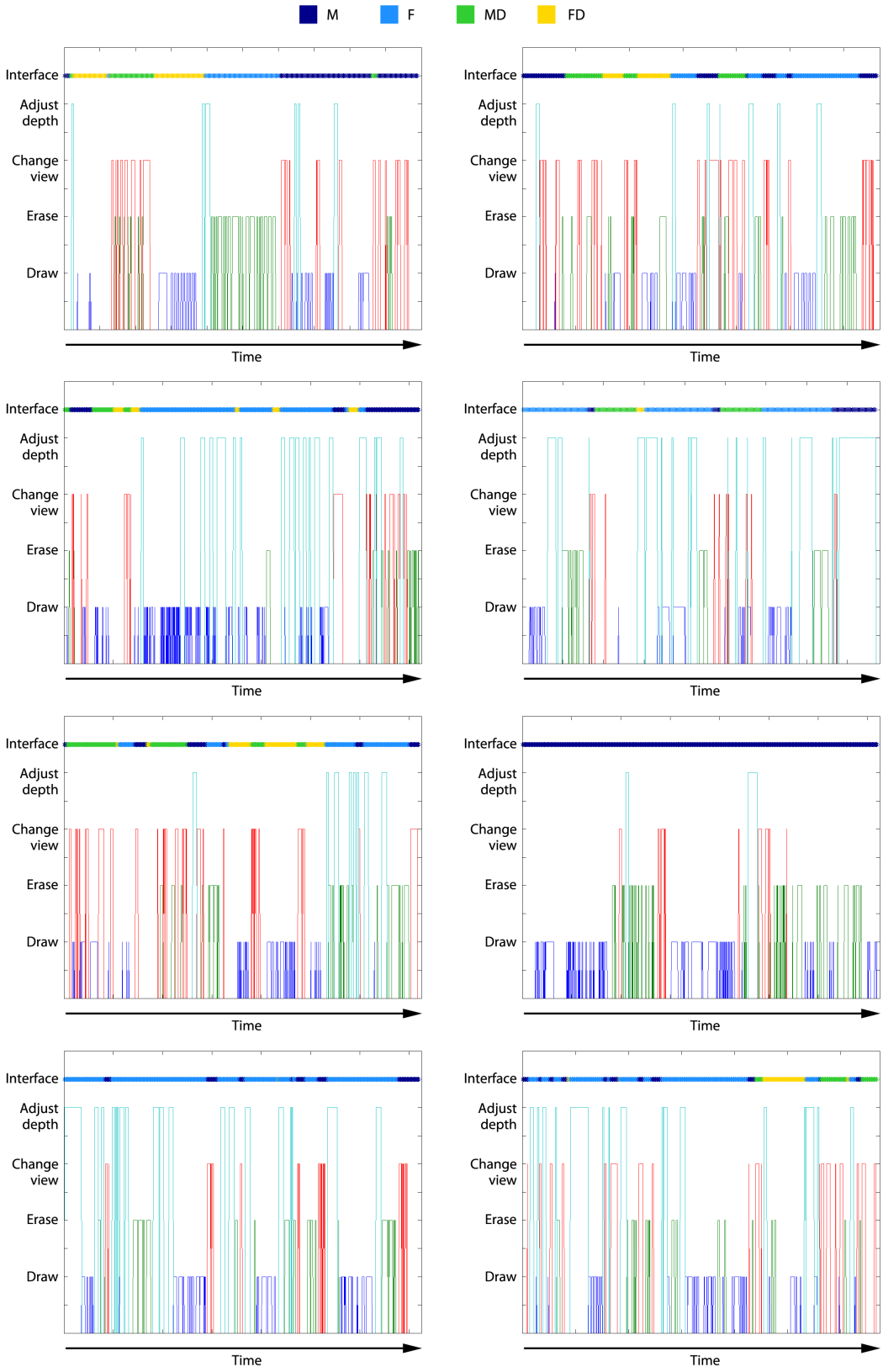


Figure S.11: *Workflow for Task S7, subjects 9-16.*

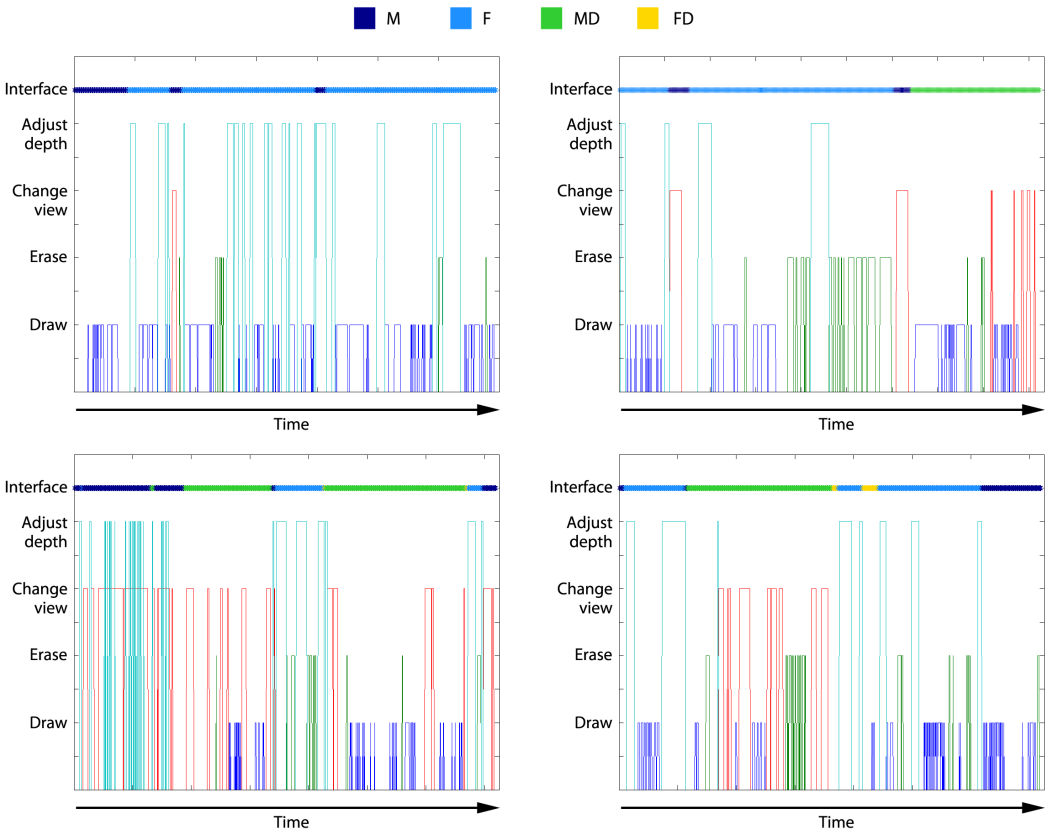
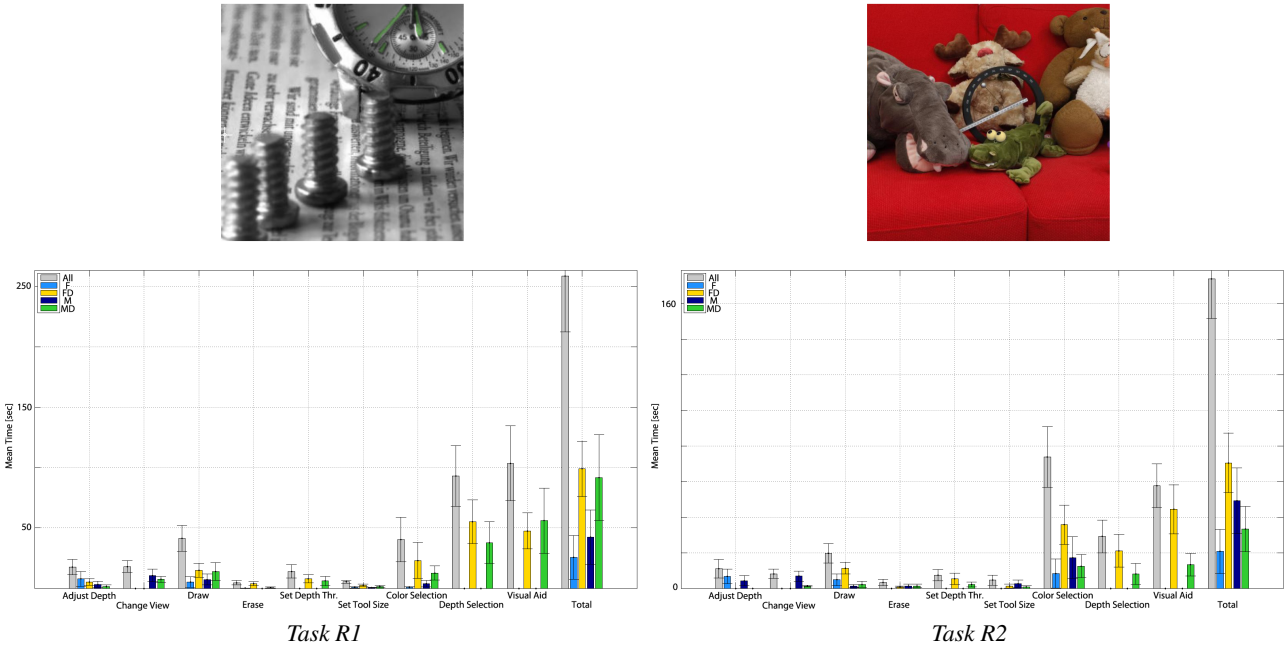


Figure S.12: *Workflow for Task S7, subjects 17-20.*

E Additional Data from Analysis of Experiment 2 (Real Scenarios)

E.1 Distribution of Times

Figures S.13 to S.15 illustrate the average times spent by users doing different actions and using different tools or features, namely: adjusting depth, changing view, drawing, erasing, setting the depth threshold (for the active depth range), setting the tool size, using the Color Selection tool, using the Depth Selection tool, and with the Visual Aid activated, plus the total time. For each of these actions or tools, the times spent in each of the four interface configurations (multiview without depth - M, focus without depth - F, multiview with depth - MD, and focus with depth - FD), as well as the total time, is shown.



Task R1 *Task R2*

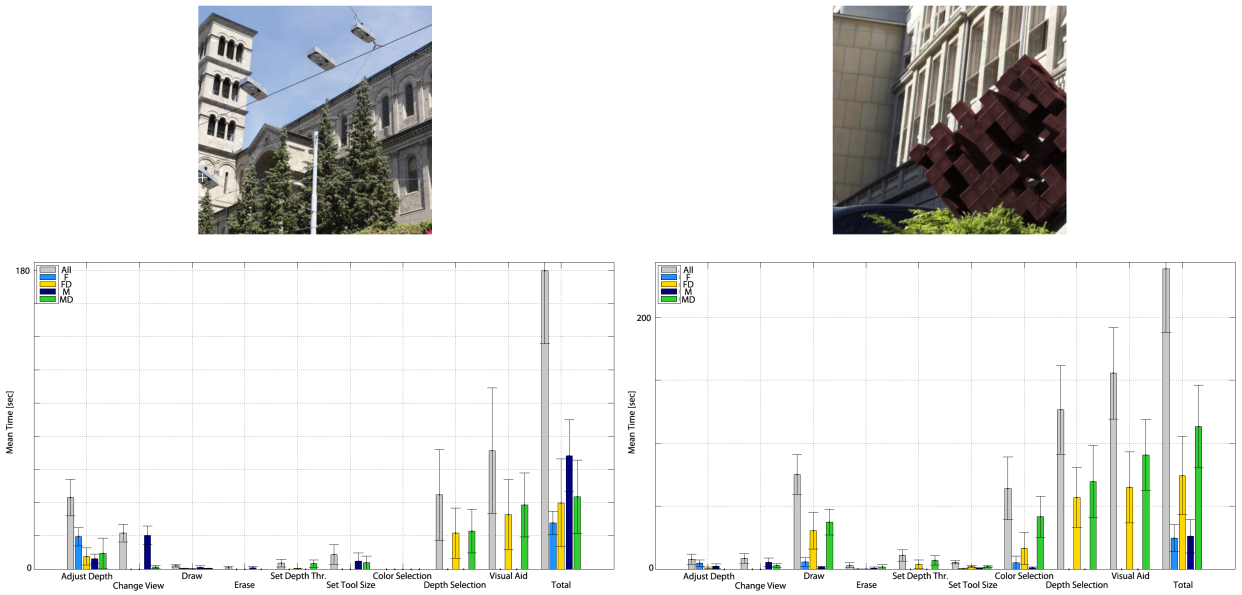
Figure S.13: *Times spent doing different actions and using different tools or features in Tasks R1 and R2, with each of the four interface configurations and in total. Please refer to text for more details.*

E.2 Workflows in Tasks

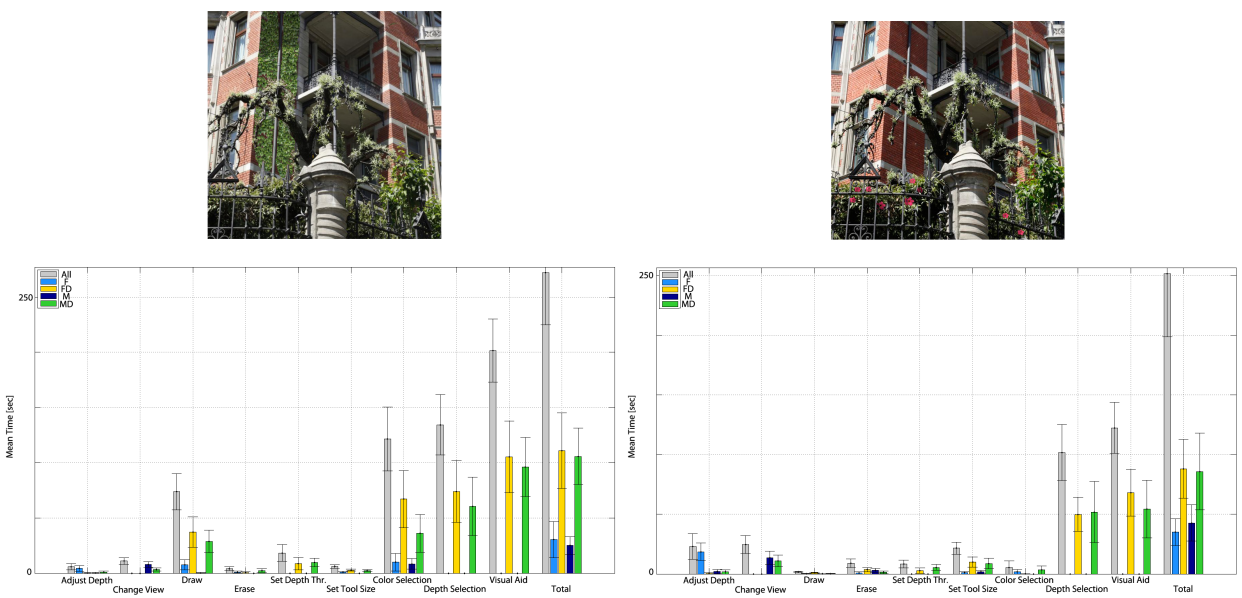
To illustrate the workflow of users in each task we include in Figures S.16 to S.25 timelines for each subject showing which configuration of the interface (multiview or focus, with or without depth) the subject is using and what for (adjusting depth, changing view, drawing, erasing, setting the depth threshold (for the active depth range), or setting the tool size). These figures also show the times during which the Color Selection tool, the Depth Selection tool, and the Visual Aid were activated, and what they were doing in each case. In these figures, in some cases users appear to be *adjusting depth* while interfaces with depth (FD or MD) are activated: this is due to users accidentally touching the *adjusting depth* controls (mouse wheel or equivalent in tablet-pen device); when computing mean times these spurious times were removed from the computation.

E.3 Rankings of Difficulty

In the final questionnaire, we ask users to rank the tasks in difficulty, 10 being the easiest and 1 the most difficult. We show in Figure S.26 the rankings of all subjects for all tasks, and in Figure S.27 the corresponding rank products, computed as explained in the main text.



Task R3 *Task R4*



Task R5 *Task R6*

Figure S.14: *Times spent doing different actions and using different tools or features in Tasks R3 to R6, with each of the four interface configurations and in total. Please refer to text for more details.*

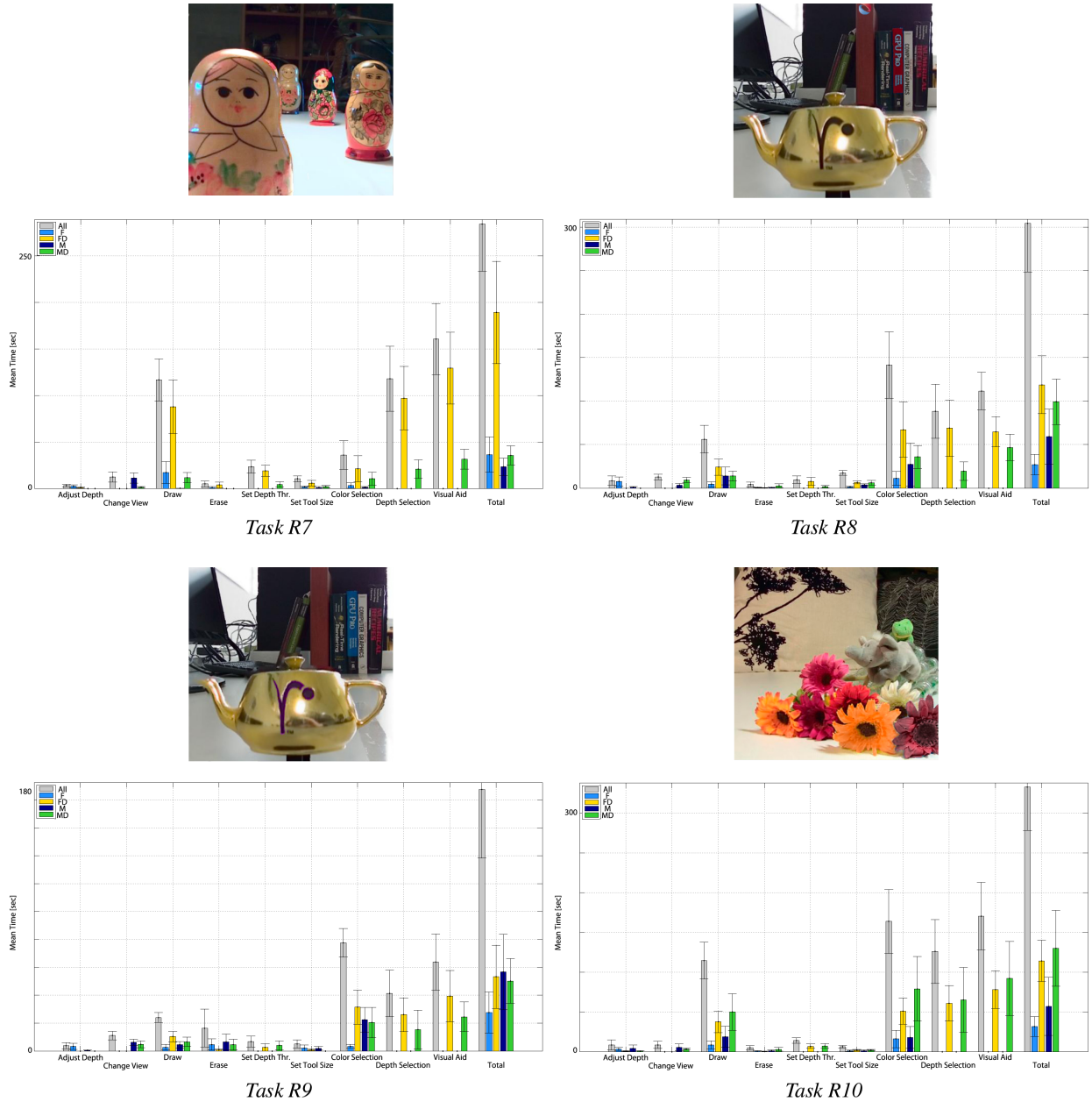


Figure S.15: *Times spent doing different actions and using different tools or features in Tasks R7 to R10, with each of the four interface configurations and in total. Please refer to text for more details.*

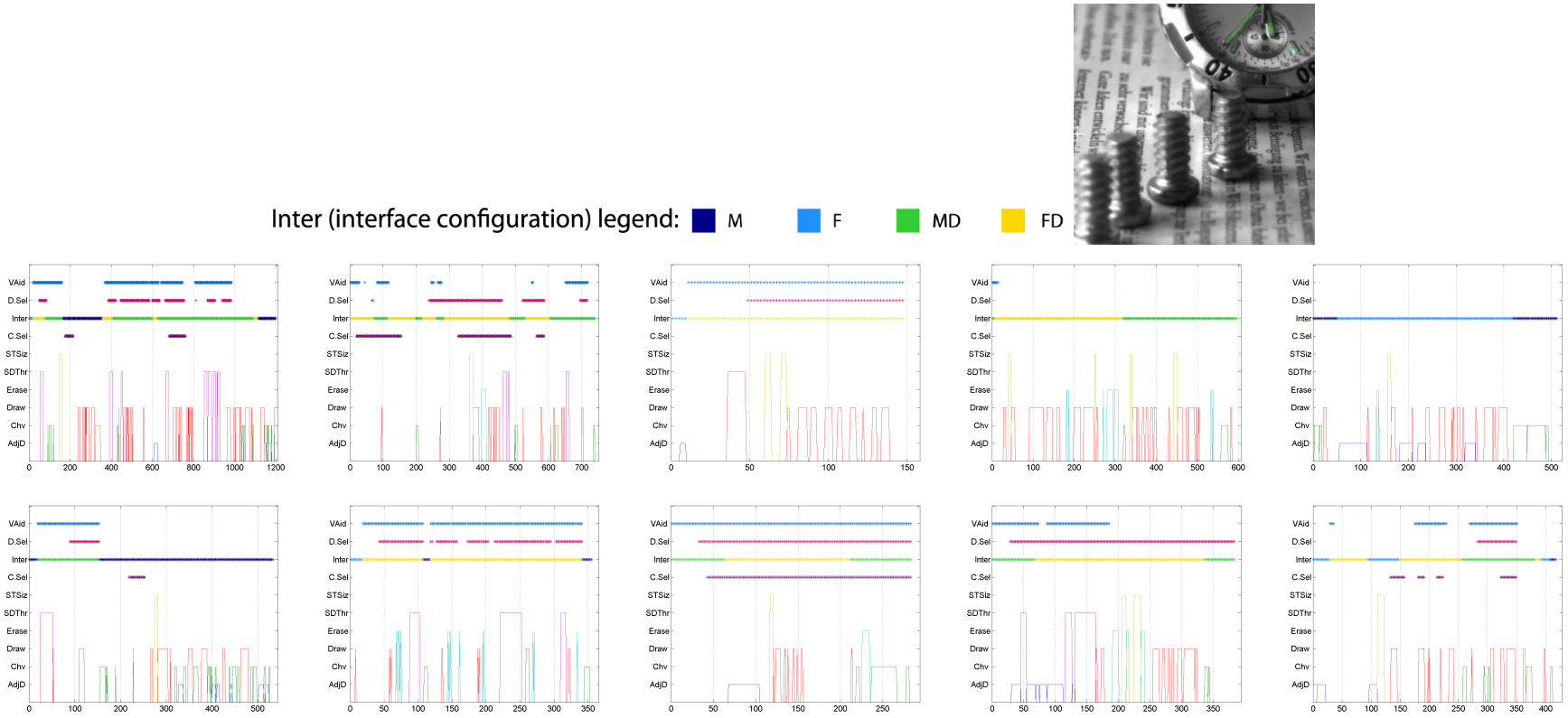


Figure S.16: *Timelines for different subjects in Task R1.*

Figure S.17: *Timelines for different subjects in Task R2.*

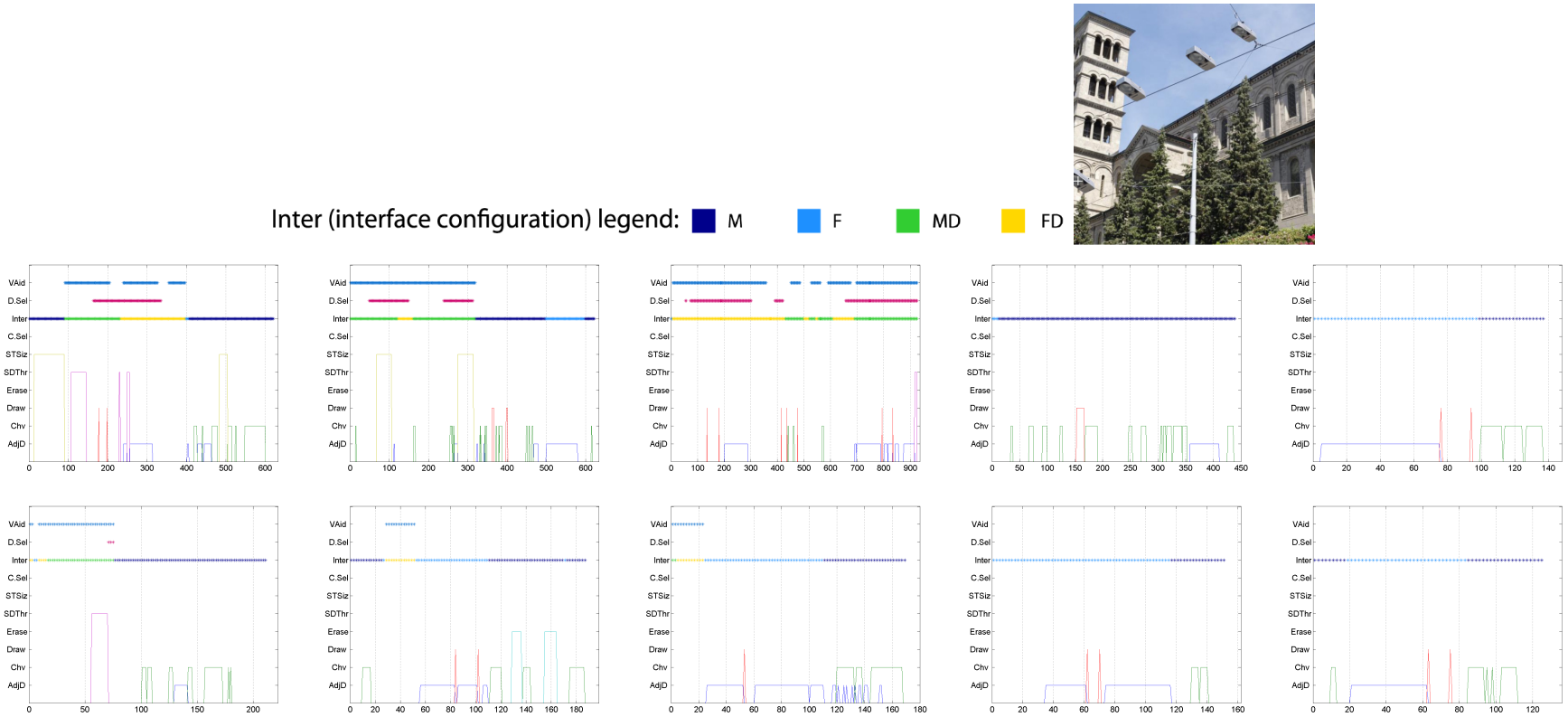


Figure S.18: *Timelines for different subjects in Task R3.*

Figure S.19: *Timelines for different subjects in Task R4.*

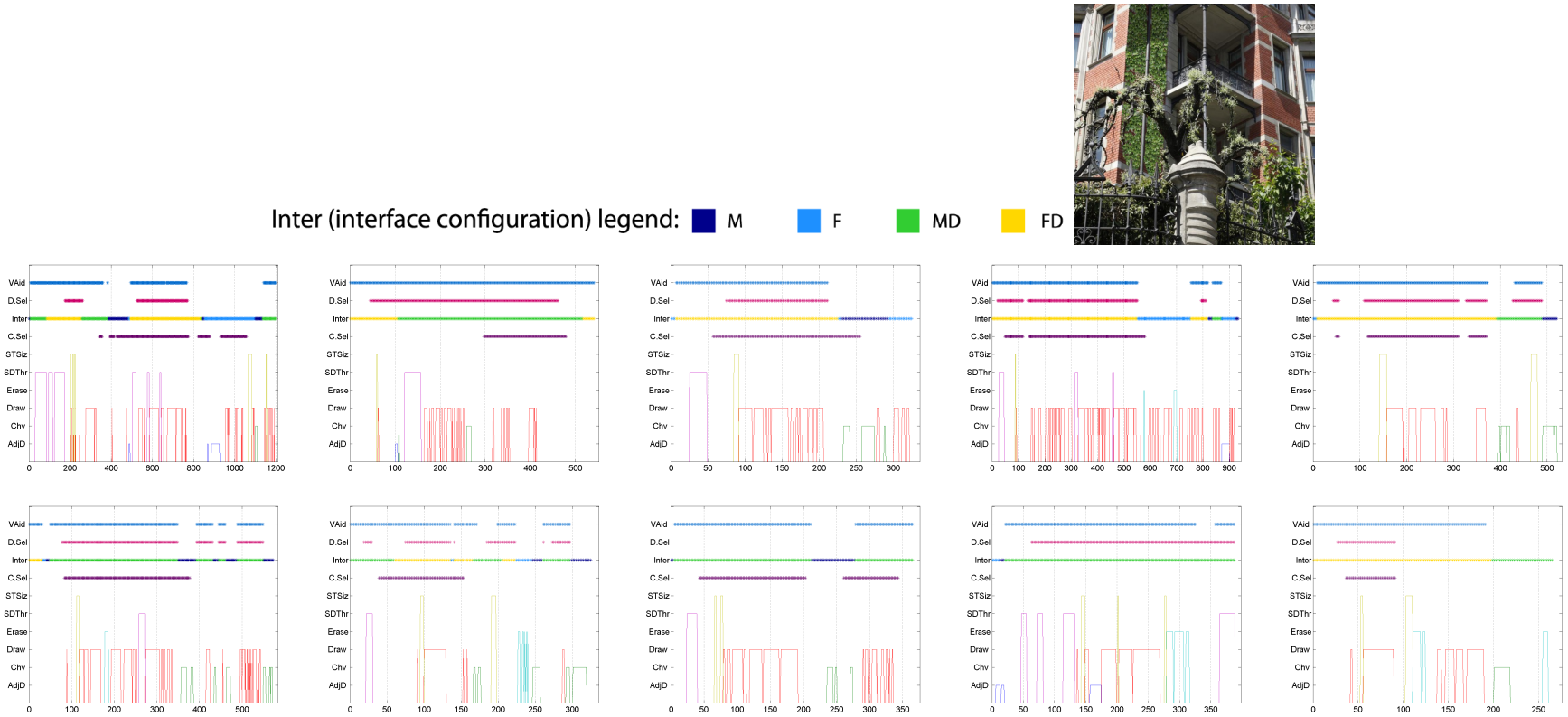


Figure S.20: *Timelines for different subjects in Task R5.*

Figure S.21: *Timelines for different subjects in Task R6.*

Figure S.22: *Timelines for different subjects in Task R7.*

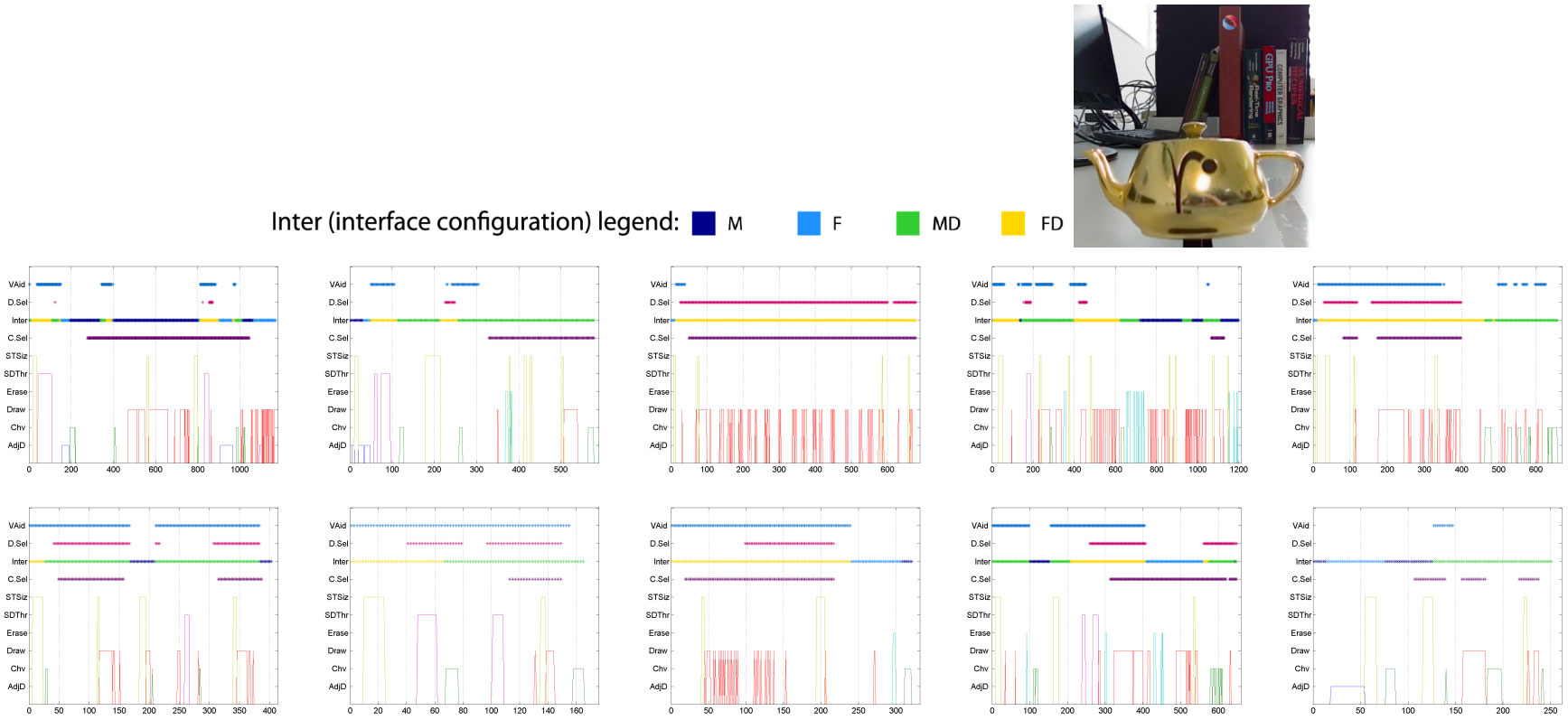


Figure S.23: *Timelines for different subjects in Task R8.*

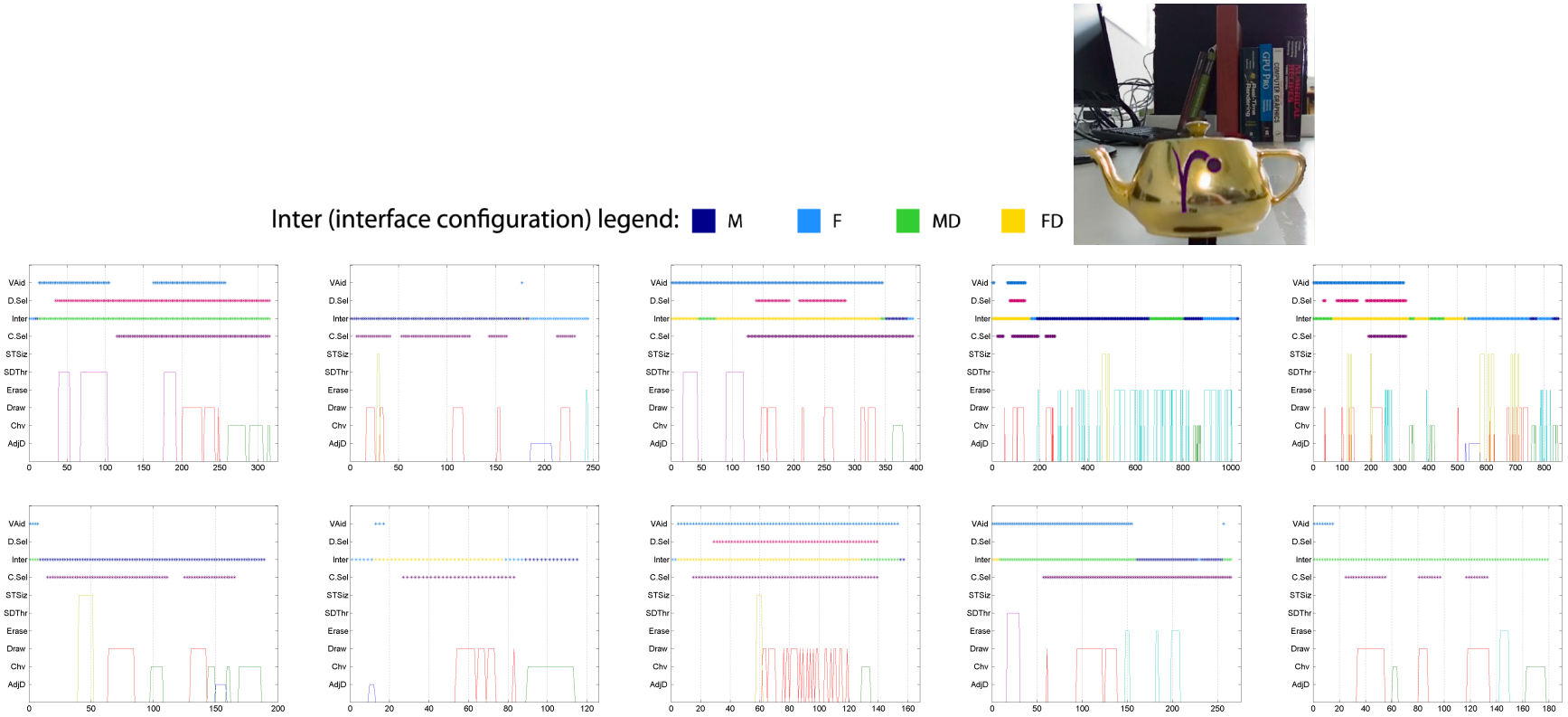


Figure S.24: *Timelines for different subjects in Task R9.*

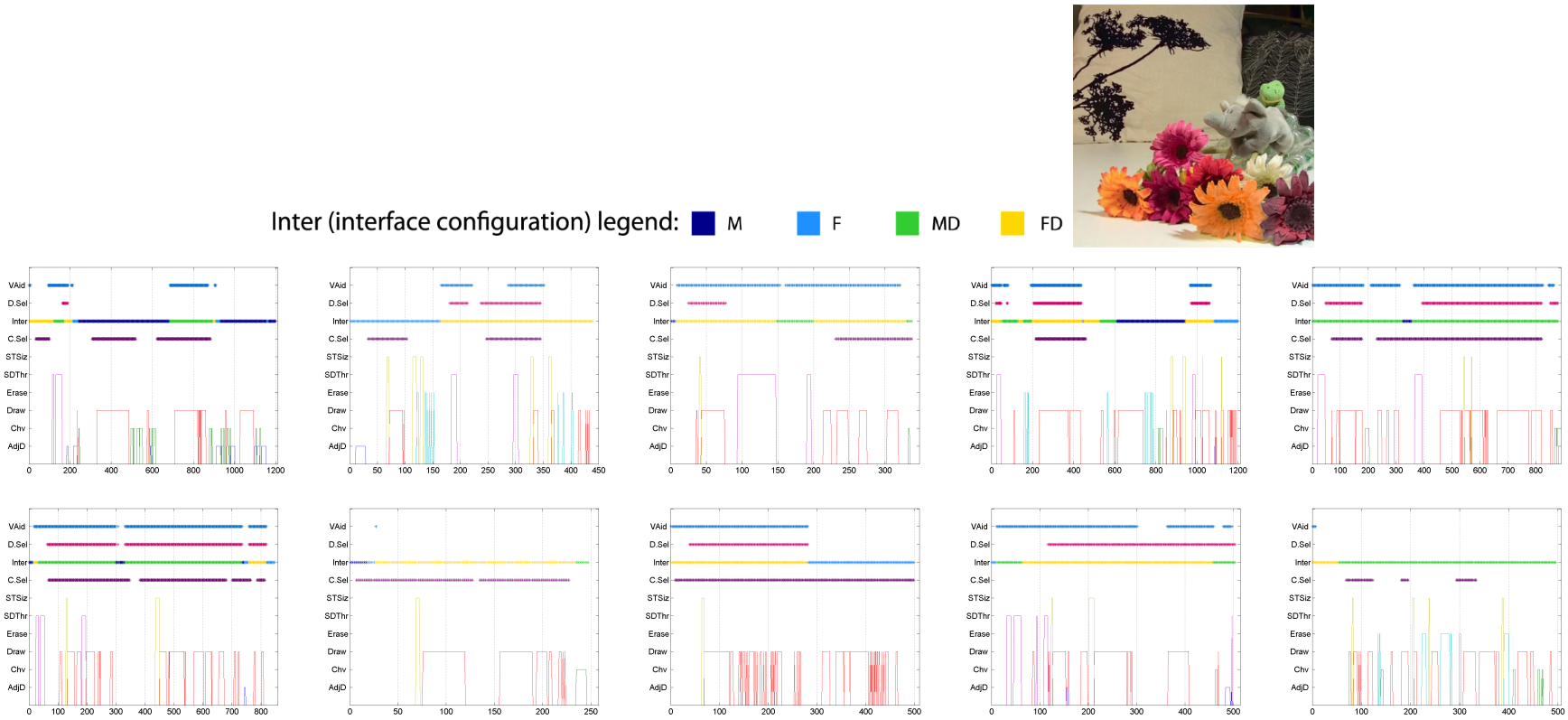


Figure S.25: *Timelines for different subjects in Task R10.*

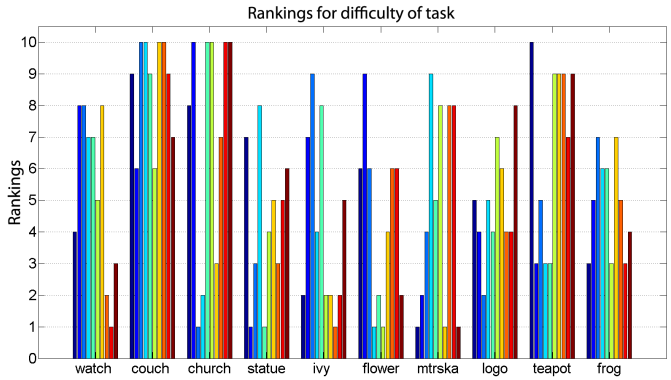


Figure S.26: *Rankings for difficulty for each task, all users.*

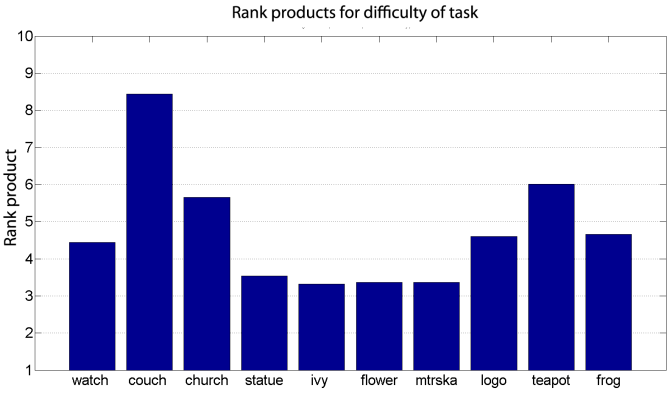


Figure S.27: *Rank products for difficulty for each task.*

F Glossary of Statistical Terms

This section compiles the definition of a series of terms used in the main text. Definitions are given in relation to the tests conducted in the main paper, and with a practical spirit; this compilation by no means pretends to be an exhaustive one of the concepts involved in repeated measures ANOVA or Kruskal-Wallis schemes, and assumes a basic knowledge of analysis of variance. For further reference, the reader can turn to excellent works [Cunningham and Wallraven 2011; Field 2009].

FACTORS AND LEVELS: In an ANOVA, we refer as factors to each of the variables that may influence the variable of our interest. Levels are each of the possible values of a factor. For example, in our Experiment 1, the type of interface is a factor, and it has four levels. Other factors could be the task, or the order in which the tasks are performed. If it is a repeated measures scheme, such as the one we have, there are *between-subjects* and *within-subjects* factors, depending on whether they vary or not across subjects.

GREENHOUSE-GEISSER CORRECTION: This correction is applied to the results of the repeated-measures ANOVA when sphericity is violated. It corrects the degrees of freedom (dof) used to evaluate the F-test; this correction of dof is done based on how large the violation of sphericity is. Greenhouse-Geisser is the most usual correction to perform when sphericity is violated, but others exist, such as the less-conservative Huynh-Feldt correction.

HOMOGENEITY OF VARIANCES: An ANOVA test assumes that the variances for all factor levels are equal (in addition to all factor levels being independent). Thus, one should test for this assumption before conducting an ANOVA, using, e.g., Levene's test.

KRUSKAL-WALLIS: It is a nonparametric extension of ANOVA used when analyizing data that cannot be assumed to follow a normal distribution (ANOVA assumes that data follows a normal distribution, even though it is somehow robust to violations of this assumption when the sample is large). Ordinal variables (in which we do not know how large the differences between values are, such as rankings) can typically not be assumed to follow a normal distribution.

MAUCHLY'S TEST: Statistical test that tests for the assumption of sphericity (see below). If the test is significant, sphericity cannot be assumed, and repeated measures ANOVA cannot be applied without some correction (such as the Greenhouse-Geisser correction, see above).

OUTLIER REJECTION BASED ON THE INTERQUARTILE DIFFERENCE: An accepted way of rejecting outliers consisting of setting an interval I defined as: $I = [Q1 - g \cdot IQD, Q3 + G \cdot IQD]$, where $Q1$ and $Q3$ are the first and third quartiles, respectively, and IQD is the inter-quartile difference ($IQD = Q3 - Q1$). The weight g can take different values, but a commonly accepted one used in this work is 2.2 [Hoaglin and Iglewicz 1987]. Data points outside the interval I are considered outliers and rejected.

PAIRWISE COMPARISONS: A way of referring to *post-hoc* tests. An ANOVA tests a null hypothesis to know whether a factor level has an influence on the observed data. However, ANOVA in principle only tells us whether we can discard or not the null hypothesis above, but not which factor level(s) have an influence on the variable of interest. Post-hoc tests typically compare the means of all combinations of pairs of groups.

REPEATED MEASURES ANOVA: A special case of ANOVA, used when the variable under study is measured using the same participants for all the different conditions. When this is the case, basic assumptions of ANOVA (such as independence of factor levels) are violated, and thus the standard ANOVA cannot be used.

SPHERICITY: Sphericity can be seen as the extension of the concept of homogeneity of variances used in ANOVA (see above) to the repeated measures scheme. In repeated measures ANOVA, factor levels can no longer be assumed to be independent (when data is collected from the same participant for different factor levels, this data is likely going to be related). Thus, differences between factor levels are used instead: Sphericity holds when the variances of the differences between factor levels are equal.

G Questionnaires

In the next pages we include the different questionnaires each subject answered throughout the experiments. These are the following:

- Experiment 1: Synthetic Scenarios
  - Preliminary questionnaire
  - Questionnaire after each task
  - Questionnaire after each session
  - Final questionnaire
- Experiment 2: Real Scenarios
  - Preliminary questionnaire
  - Questionnaire after each task
  - Final questionnaire

G.1 Experiment 1: Synthetic Scenarios

G.1.1 Preliminary Questionnaire

Gender:

(a) Male
(b) Female

Age:

Do you have a background on (mark more than one answer if necessary):

(a) art and/or design
(b) technical background (engineering or similar)
(c) none of the above (please specify): _____

Indicate, according to the scale, your previous experience in the use of the following software:

Scale: (1): I've never used it
(2): Little experience
(3): Medium experience
(4): High experience
(5): Very high, I consider myself an expert

(a) image editing (Photoshop, GiMP, etc)	(1) - (2) - (3) - (4) - (5)
(b) 3D modeling (3D Studio Max, Inventor, Blender, etc)	(1) - (2) - (3) - (4) - (5)
(c) zBrush or Sculptris	(1) - (2) - (3) - (4) - (5)

Do you use the software in the previous list (or similar ones)…? (mark more than one option if necessary)

(a) professionally
(b) as a student
(c) in your personal life

G.1.2 Questionnaire after each task

For directed tasks [task 1..task 5]:

How difficult has completing the task with this interface been?

Very difficult Very easy
(1) - (2) - (3) - (4) - (5)

How similar do you think your result is to what you have been asked to do?

Very different Very similar
(1) - (2) - (3) - (4) - (5)

For open task 6:

How difficult has completing this task been?

Very difficult Very easy
(1) - (2) - (3) - (4) - (5)

How satisfied are you with the result obtained?

Very unsatisfied Very satisfied
(1) - (2) - (3) - (4) - (5)

How helpful has being able to toggle depth on/off been?

Not helpful Very helpful
(1) - (2) - (3) - (4) - (5)

Comments or suggestions:

For open task 7:

How difficult has completing this task been?

Very difficult Very easy
(1) - (2) - (3) - (4) - (5)

How satisfied are you with the result obtained?

Very unsatisfied Very satisfied
(1) - (2) - (3) - (4) - (5)

How helpful has being able to switch between interfaces been?

Not helpful Very helpful
(1) - (2) - (3) - (4) - (5)

Comments or suggestions:

G.1.3 Questionnaire after each session

(i.e. after completing the five directed tasks with one interface)

1. How much have you used the second window of the interface?

   Not at all A lot

   (1) - (2) - (3) - (4) - (5)

   What for? (ignore this question if you answered (1) in the previous question).

2. Could you specify the depth and position at which you wanted the edits to be?

   Never Always

   (1) - (2) - (3) - (4) - (5)

3. Do you plan how you are going to do the editing, or are you more inclined towards “trial and error” (editing and erasing)?

   (a) I plan the process

   (b) I go by trial and error

4. Order the tasks from most difficult (1) to easiest (5)

Task 1 – drawing initial on the wall	( )
Task 2 – changing the color of the pattern on the vase	( )
Task 3 – modifying the specular highlights on the statue	( )
Task 4 – placing the paper airplane in the scene	( )
Task 5 – drawing a heart behind the railing	( )

5. Did you notice any difference in your workflow as tasks progressed?
   a. Yes, because tasks became more complex
   b. Yes, because I got used to the interface
   c. Both, (a) and (b).
   d. No.

6. Which aspects of the interface made the tasks easier or more difficult?

7. Comments or suggestions:

G.1.4 Final questionnaire

1. I can place the edit at the depth I intended:

	It is very hard	It is very easy
Focus, depth off (*FDoff*)	(1) - (2) - (3) - (4) - (5)	
Focus, depth on (*FDon*)	(1) - (2) - (3) - (4) - (5)	
Multiview, depth off (*MDoff*)	(1) - (2) - (3) - (4) - (5)	
Multiview, depth on (*MDon*)	(1) - (2) - (3) - (4) - (5)	

If you were forced to choose:

1st easiest: _____
2nd easiest: _____
3rd easiest: _____
4th easiest: _____

2. I can place the edit in the position (x-y, in the plane parallel to the screen) I intended:

	It is very hard	It is very easy
Focus, depth off (*FDoff*)	(1) - (2) - (3) - (4) - (5)	
Focus, depth on (*FDon*)	(1) - (2) - (3) - (4) - (5)	
Multiview, depth off (*MDoff*)	(1) - (2) - (3) - (4) - (5)	
Multiview, depth on (*MDon*)	(1) - (2) - (3) - (4) - (5)	

If you were forced to choose:

1st easiest: _____
2nd easiest: _____
3rd easiest: _____
4th easiest: _____

3. When erasing, I can delete what I intended:

	Completely disagree	Completely agree
Focus, depth off (*FDoff*)	(1) - (2) - (3) - (4) - (5)	
Focus, depth on (*FDon*)	(1) - (2) - (3) - (4) - (5)	
Multiview, depth off (*MDoff*)	(1) - (2) - (3) - (4) - (5)	
Multiview, depth on (*MDon*)	(1) - (2) - (3) - (4) - (5)	

If you were forced to choose:

1st preferred to erase: _____
2nd preferred to erase: _____
3rd preferred to erase: _____
4th preferred to erase: _____

4. Difficulty of use of the interface:

	Very difficult — Very easy
Focus, depth off (*FDoff*)	(1) - (2) - (3) - (4) - (5)
Focus, depth on (*FDon*)	(1) - (2) - (3) - (4) - (5)
Multiview, depth off (*MDoff*)	(1) - (2) - (3) - (4) - (5)
Multiview, depth on (*MDon*)	(1) - (2) - (3) - (4) - (5)

If you were forced to choose:

1st easiest: _____
2nd easiest: _____
3rd easiest: _____
4th easiest: _____

5. Accuracy of the editing process with the interface:

	Very inaccurate — Very accurate
Focus, depth off (*FDoff*)	(1) - (2) - (3) - (4) - (5)
Focus, depth on (*FDon*)	(1) - (2) - (3) - (4) - (5)
Multiview, depth off (*MDoff*)	(1) - (2) - (3) - (4) - (5)
Multiview, depth on (*MDon*)	(1) - (2) - (3) - (4) - (5)

If you were forced to choose:

1st most accurate: _____
2nd most accurate: _____
3rd most accurate: _____
4th most accurate: _____

6. Preference in each task:

6a. Preference in Task 1 [drawing initial on the wall]:

	Low preference — High preference
Focus, depth off (*FDoff*)	(1) - (2) - (3) - (4) - (5)
Focus, depth on (*FDon*)	(1) - (2) - (3) - (4) - (5)
Multiview, depth off (*MDoff*)	(1) - (2) - (3) - (4) - (5)
Multiview, depth on (*MDon*)	(1) - (2) - (3) - (4) - (5)

If you were forced to choose:

1st preferred: _____
2nd preferred: _____
3rd preferred: _____
4th preferred: _____

6b. Preference in Task 2 [changing the color of the pattern on the vase]:

	Low preference	High preference
Focus, depth off (*FDoff*)	(1) - (2) - (3) - (4) - (5)	
Focus, depth on (*FDon*)	(1) - (2) - (3) - (4) - (5)	
Multiview, depth off (*MDoff*)	(1) - (2) - (3) - (4) - (5)	
Multiview, depth on (*MDon*)	(1) - (2) - (3) - (4) - (5)	

If you were forced to choose:

1st preferred: _____
2nd preferred: _____
3rd preferred: _____
4th preferred: _____

6c. Preference in Task 3 [modifying the specular highlights on the statue]:

	Low preference	High preference
Focus, depth off (*FDoff*)	(1) - (2) - (3) - (4) - (5)	
Focus, depth on (*FDon*)	(1) - (2) - (3) - (4) - (5)	
Multiview, depth off (*MDoff*)	(1) - (2) - (3) - (4) - (5)	
Multiview, depth on (*MDon*)	(1) - (2) - (3) - (4) - (5)	

If you were forced to choose:

1st preferred: _____
2nd preferred: _____
3rd preferred: _____
4th preferred: _____

6d. Preference in Task 4 [placing the paper airplane in the scene]:

	Low preference	High preference
Focus, depth off (*FDoff*)	(1) - (2) - (3) - (4) - (5)	
Focus, depth on (*FDon*)	(1) - (2) - (3) - (4) - (5)	
Multiview, depth off (*MDoff*)	(1) - (2) - (3) - (4) - (5)	
Multiview, depth on (*MDon*)	(1) - (2) - (3) - (4) - (5)	

If you were forced to choose:

1st preferred: _____
2nd preferred: _____
3rd preferred: _____
4th preferred: _____

6e. Preference in Task 5 [drawing a heart behind the railing]:

	Low preference	High preference
Focus, depth off (*FDoff*)	(1) - (2) - (3) - (4) - (5)	
Focus, depth on (*FDon*)	(1) - (2) - (3) - (4) - (5)	
Multiview, depth off (*MDoff*)	(1) - (2) - (3) - (4) - (5)	
Multiview, depth on (*MDon*)	(1) - (2) - (3) - (4) - (5)	

If you were forced to choose:

1st preferred: _____
2nd preferred: _____
3rd preferred: _____
4th preferred: _____

7. Overall, which interface do you prefer to edit a *light field*?

	Low preference	High preference
Focus, depth off (*FDoff*)	(1) - (2) - (3) - (4) - (5)	
Focus, depth on (*FDon*)	(1) - (2) - (3) - (4) - (5)	
Multiview, depth off (*MDoff*)	(1) - (2) - (3) - (4) - (5)	
Multiview, depth on (*MDon*)	(1) - (2) - (3) - (4) - (5)	

If you were forced to choose:

1st preferred: _____
2nd preferred: _____
3rd preferred: _____
4th preferred: _____

What **do** you like about your first preference?

What **don't** you like about your last preference?

G.2 Experiment 2: Real Scenarios

G.2.1 Preliminary Questionnaire

Gender:

(a) Male
(b) Female

Age:

Are you: (a) right-handed
(b) left-handed

Do you have a background on (mark more than one answer if necessary):

(d) art and/or design
(e) technical background (engineering or similar)
(f) none of the above (please specify): _____

Indicate, according to the scale, your previous experience in the use of the following software:

Scale: (1): I've never used it
(2): Little experience
(3): Medium experience
(4): High experience
(5): Very high, I consider myself an expert

(d) image editing (Photoshop, GiMP, etc) (1) - (2) - (3) - (4) - (5)
(e) 3D modeling (3D Studio Max, Inventor, Blender, etc) (1) - (2) - (3) - (4) - (5)
(f) zBrush or Sculptris (1) - (2) - (3) - (4) - (5)

Do you use the software in the previous list (or similar ones)…? (mark more than one option if necessary)

(d) professionally
(e) as a student
(f) in your personal life

Are you familiar with the concept of light field?

Not at all Thoroughly
(1) - (2) - (3) - (4) - (5)

Have you seen or dealt with a Lytro or Raytrix light field camera before? (mark all that apply)

(a) I have seen it
(b) I have used it

Have you used any light field editing tool before?

(a) Yes
(b) No

G.2.2 Questionnaire after each task

How difficult has completing the task with this interface been?

Very difficult Very easy
(1) - (2) - (3) - (4) - (5)

How similar do you think your result is to what you have been asked to do?

Very different Very similar
(1) - (2) - (3) - (4) - (5)

Have you been able to specify the depth and position where you wanted to edit?

No, never Yes, always
(1) - (2) - (3) - (4) - (5)

Have you noticed any inaccuracies in the depth information?

None Many
(1) - (2) - (3) - (4) - (5)

If so, did they affect your editing process in a significant manner?

Not at all A lot
(1) - (2) - (3) - (4) - (5)

G.2.3 Final questionnaire

1. Choose the most appropriate answer: What is your preference for:

	Multiview	Focus
Editing	(1) - (2) - (3) - (4) - (5)	
Visualizing the results	(1) - (2) - (3) - (4) - (5)	

If you were forced to choose (put a circle around your choice):

Editing: _____ Multiview Focus

Visualizing the results: _____ Multiview Focus

2. How useful has depth information been?

Not useful at all Very useful

(1) - (2) - (3) - (4) - (5)

3. How much have you used depth information ("Using depth" option)?

Not at all A lot

(1) - (2) - (3) - (4) - (5)

4. How much have you used the second window of the interface?

Not at all A lot

(1) - (2) - (3) - (4) - (5)

What for? (Note: If you have answered (1) in the previous question ignore this one)

5. Have you noticed inaccuracies in depth information of the light fields?

None Many

(1) - (2) - (3) - (4) - (5)

6. Did these inaccuracies affect significantly your editing process?

Note: Ignore this question if you have answered (1) in the previous one.

Not at all A lot

(1) - (2) - (3) - (4) - (5)

7. How did your editing process change due to depth inaccuracies?

Note: Ignore this question if you have answered (1) in the previous one.

8. How useful was the:

	Not useful at all — Very useful
(a) Depth Selection tool	(1) - (2) - (3) - (4) - (5)
(b) Color Selection tool	(1) - (2) - (3) - (4) - (5)

9. How frequently did you use the:

	Never — Very frequently
(c) Depth Selection tool	(1) - (2) - (3) - (4) - (5)
(d) Color Selection tool	(1) - (2) - (3) - (4) - (5)

10. Would you say that the utility of the Color Selection tool depends on how good the depth information of the light field is?
    And does the utility of the Depth Selection tool depend on that?

11. Could you approximately describe the process followed to…
    a. …edit planar surfaces (e.g. when changing the color of the book)

    b. …edit curved surfaces (e.g. the matrioska, or the flowers)

    c. …deal with occlusions (e.g. the flowers of the bush)

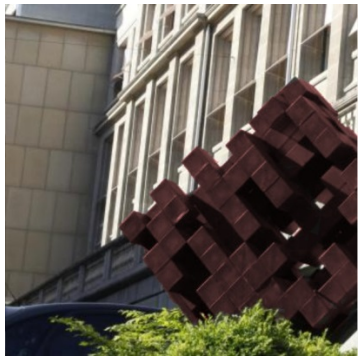
    d. …place objects in free space (e.g. the street lights on the cable)

12. Rank the tasks from 1 to 10 according to their difficulty, by placing a number next to the caption (1: most difficult; 10: easiest):

Task 1

Task 2

Task 3



Task 4

Task 5

Task 6

Task 7

Task 8

Task 9

Task 10

What have you found difficult in the task you have marked as the first one (i.e. with a number “1”, the most difficult)?

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