**Supplementary material: Review sample**

The full sample of reviewed protocol studies is presented in below.

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| No. | Author | Study type1 | Data2 | Length (mins)3 | NP3,4 | Task type5 | NT4 | Participant experience levels |
|
| 1 | Akin, 1979 | F | C, Sk | 240 | 1 | AD | 1 | Professional designer |
| 2 | Eckersley, 1988 | F | C, Vi | 40 | 5 | AD | 1 | 2 practicing and 3 student interior designers |
| 3 | Chan, 1990 | F | C, Vi | 240 | 1 | AD | 1 | Student, 10 years architecture experience |
| 4 | Goldschmidt, 1991 | F | C, Sk | 60 – 120 | 8 | AD | 1 | 7 experienced architects and 1 architecture student |
| 5 | Stauffer and Ullman, 1991 | F | C, Sk, Vi | 360 – 600 | 5 | ED | 2 | 2 – 14 years industrial design experience |
| 6 | Lloyd and Scott, 1994 | F | C | 40 | 5 | ED | 1 | Electrical engineers, 3 – 10 years experience |
| 7 | Goel, 1995 | F | C, Sk, Vi | 120 | 12 | AD/ ED | 3 | Mixture of professional architects, mechanical engineers, and instructional designers |
| 8 | Akin and Akin, 1996 | F | C, Sk, Vi | 35 | 8 | AD | 1 | 4 expert and 4 novice designers |
| 9 | Athavankar, 1997 | F | C, Sk, Vi | 76 | 1 | PDE | 1 | Senior established industrial designer in his early forties |
| 10 | Suwa and Tversky, 1997 | F | R, Vi | 45 | 9 | AD | 1 | 2 practising architects and 7 architecture students |
| 11 | McNeill et al., 1998 | F | C, Vi | 45 | 9 | PDE | 1 | Mixture of practicing and student engineers (0 – 38 years experience) |
| 12 | Suwa et al., 1998b | A | R, Sk | 35 | 1 | AD | 1 | No information provided |
| 13 | Suwa et al., 2000 | A | R, Sk, Vi | 45 | 1 | AD | 1 | Practising architect |
| 14 | Dorst and Cross, 2001 | F | C, Vi | 150 | 9 | PDE | 1 | 5 – 20 years professional experience (all working in design consultancies) |
| 15 | Kavakli and Gero, 2001 | A | R, Sk | N/S | 2 | AD | 1 | 1 expert (over 25 years experience) and 1 novice (student) architect |
| 16 | Won, 2001 | F | R, Sk, Vi | 90 | 2 | PDE | 1 | Industrial designers with over 3 years experience each |
| 17 | Kavakli and Gero, 2002 | A | R | 45 | 2 | AD | 1 | 1 expert (25 years experience) and 1 novice (student) architect |
| 18 | Bilda and Demirkan, 2003 | A | R, Vi | 60 | 6 | AD | 1 | Graduate students in interior architecture and environmental design, with matched abilities and experience in CAD |
| 19 | Chiu, 2003 | F | R, Sk, Vi | N/S | 12 | AD | 1 | 2 expert (10 years experience) and 10 novice (Masters-level graduates) designers |
| 20 | Maher and Tang, 2003 | A | C, Vi | N/S | N/S | AD/ PDE | 2 | First task = third year design students; second task = practicing architects with 30 years’ experience |
| 21 | Suwa, 2003 | A | R, Sk, Vi | 45 | 1 | AD | 1 | Experienced architect |
| 22 | Ball et al., 2004 | F | C, Vi | 60 | 16 | PDE | 1 | 8 experts (mean experience = 15.1 years) and 8 novice (mean experience = 3.5 years) designers |
| 23 | Kim et al., 2005 | F | C, Sk, Vi | 60 | 4 | PDE | 1 | Experts (over 5 years experience) |
| 24 | Bilda et al., 2006 | F | C, Sk, Vi | 45 | 3 | AD | 2 | Over 10 years architecture experience each |
| 25 | Jin and Chusilp, 2006 | F | C, Sk, Vi | 50 | 16 | ED/ PDE | 2 | Mixture of industrial, systems, and mechanical engineering students at senior and graduate level |
| 26 | Kim et al., 2006 | F | C | 60 | 8 | PDE | 1 | 4 expert (over 5 years experience) and 4 student (0 years experience) designers |
| 27 | Kruger and Cross, 2006 | A | C, Vi | 150 | 9 | PDE | 1 | Experienced industrial designers |
| 28 | Maher and Kim, 2006 | A | C, Vi | N/S | N/S | AD | 2 | N/S |
| 29 | Chen and Zhao, 2006 | F | C, Sk, Vi | N/S | 8 | PDE | 1 | No information provided |
| 30 | Bilda and Gero, 2007 | F | C, Sk, Vi | 40 – 50 | 6 | AD | 2 | Over 15 years architecture experience each |
| 31 | Kim et al., 2007 | A | C, Sk, Vi | 60 | 8 | PDE | 1 | 4 industrial designers (over 5 years experience) and 4 students |
| 32 | Park and Kim, 2007 | F | C, Sk, Vi | 60 | 2 | PDE | 1 | 1 expert and 1 student designer |
| 33 | Athavankar et al., 2008 | F | C, Sk, Vi | 14 – 30 | 4 | AD | 1 | 2 – 3 years professional architecture experience each |
| 34 | Liikkanen and Perttula, 2009 | F | C, Vi | 20 | 16 | ED/ PDE | 2 | Engineering students |
| 35 | Jin and Benami, 2010 | F | C, Sk, Vi | 30 | 4 | ED | 1 | 2 senior and 2 Master’s engineering students |
| 36 | Kim et al., 2010 | F | C, R, Sk, Vi | 60 | 8 | PDE | 1 | 6 expert (mean experience = 9 years) and 2 novice (students) designers |
| 37 | Lane and Seery, 2011 | F | C, Vi | 20 | 4 | PDE | 1 | Engineering students |
| 38 | Daly et al., 2012 | F | C, R, Sk | 25 | 36 | PDE | 1 | Mixture of engineering students and practitioners, ranging from 0 – 31 years experience |
| 39 | Chandrasekera et al., 2013 | F | C, R, Vi | 14 – 15 | 2 | AD | 1 | No information provided |
| 40 | Leblebici-Basar and Altarriba, 2013 | F | R, Vi | 15 | 12 | PDE | 3 | Professional designers (2 – 37 years experience; mean = 12 years) |
| 41 | Sun et al., 2013 | F | R, Sk | Various | 15 | PDE | 1 | Engineering students (0 – 5 years experience) |
| 42 | Yu et al., 2013 | F | C, Vi | 40 | 5 | AD | 2 | Professional architects with mean experience = 7 years |
| 43 | Kim and Ryu, 2014 | F | C, R, Vi | 60 | 16 | PDE | 1 | 8 expert (mean experience = 8.25 years) and 8 novice (students) designers |
| 44 | Lee et al., 2014 | F | C, Vi | 60 | 4 | AD | 1 | Postgraduate students, 2 with over 5 years’ experience and 2 with 1 year experience |
| 45 | Yu et al., 2014 | A | C, Vi | 40 | 8 | AD | 1 | Professional architects; mean architecture experience = 8 years |
| 46 | Yu and Gero, 2015 | F | C, Vi | 40 | 8 | AD | 2 | Professional architects; mean architecture experience = 8 years |
| 47 | Yu et al., 2015 | F | C, Vi | 40 | 8 | AD | 1 | Mixture of lecturers with past practical experience and practicing architects; mean architecture experience = 8 years |

1 Study type abbreviations: A = protocol analysis only; F = full protocol study.

2 Data type abbreviations: C = concurrent verbalisations; R = retrospective verbalisations; Sk = sketches; Vi = video.

3 N/S = characteristic not specified by authors.

4 NP = number of participants; NT = number of tasks studied.

5 Task type abbreviations: AD = architectural design task; ED = engineering design task; PDE = product design engineering task.