



Fig. 3. Examining validity threats.

## Description of values

	Value	Description
Conclusion	Single	Single datapoints comparison
	Means	Means comparison
	Inferential	Inferential statistics
Internal	No	No sources of randomness considered
	Some	Classical sources of randomness considered
	All	All (other than classical) sources of randomness considered
Construct	None	Neither factors nor treatments described
	Factors	Factors completely described but not treatments
	Both	Both factors and treatments completely described

## Summary of experimental validity

Conclusion	Internal	Construct	Count	Percentage
single	no	none	6	3%
single	no	factors	44	23%
single	no	both	14	7%
single	some	none	1	1%
single	some	factors	38	20%
single	some	both	6	3%
single	all	none	0	0%
single	all	factors	0	0%
single	all	both	0	0%
means	no	none	0	0%
means	no	factors	2	1%
means	no	both	3	2%
means	some	none	0	0%
means	some	factors	50	26%
means	some	both	5	3%
means	all	none	0	0%
means	all	factors	0	0%
means	all	both	0	0%
inferential	no	none	0	0%
inferential	no	factors	4	2%
inferential	no	both	0	0%
inferential	some	none	0	0%
inferential	some	factors	21	11%
inferential	some	both	0	0%
inferential	all	none	0	0%
inferential	all	factors	0	0%
inferential	all	both	0	0%

## Experimental validity

Venue	Paper #	Experiment	Type	Conclusion	Internal	Construct
ICSE	AP1	E1	Optimization	single	no	factors
		E2	Evaluation	single	some	factors
		E3	Generalization	means	some	factors
		E4	Generalization	inferential	no	factors
ICSE	AP2	E1	Evaluation	inferential	no	factors
ICSE	AP3	E1	Evaluation	single	some	factors
		E2	Evaluation	single	some	factors
		E3	Evaluation	single	some	factors
ICSE	AP4	E1	Optimization	single	no	both
		E2	Evaluation	single	no	factors
ICSE	AP5	E1	Optimization+evaluation	single	no	factors
		E2	Evaluation	single	no	factors
		E3	Evaluation	single	no	factors
		E4	Optimization	single	no	none
ICSE	AP6	E1	Optimization	means	no	both
		E2	Generalization	means	some	factors
		E3	Generalization	means	some	factors
		E4	Generalization	means	some	factors
		E5	Evaluation	single	no	factors
ICSE	AP7	E1	Optimization	single	no	both
		E2	Evaluation	single	some	factors
		E3	Generalization	single	no	factors
ICSE	AP8	E1	Evaluation	single	no	factors
		E2	Evaluation	single	no	factors
		E3	Optimization	single	no	factors
		E4	Optimization	single	no	factors
ICSE	AP9	E1	Evaluation	single	no	factors
		E2	Optimization	single	no	factors
ICSE	AP10	E1	Optimization	single	no	factors
		E2	Evaluation	inferential	some	factors
		E3	Evaluation	means	some	factors
		E4	Optimization	means	some	factors
ICSE	AP11	E1	Evaluation	inferential	no	factors
		E2	Evaluation	inferential	no	factors
ICSE	AP12	E1	Evaluation	single	some	factors
		E2	Generalization	means	some	factors
		E3	Generalization	means	some	factors
		E4	Optimization	single	some	factors
ICSE	AP13	E1	Optimization	means	some	both
		E2	Evaluation	means	some	factors
		E3	Evaluation	means	some	factors
		E4	Optimization	means	some	factors
		E5	Optimization	means	some	factors
ICSE	AP14	E1	Optimization	single	some	both
		E2	Evaluation	single	some	factors
		E3	Optimization	single	no	factors

## Experimental validity

Venue	Paper #	Experiment	Type	Conclusion	Internal	Construct
ICSE	AP15	E1	Optimization+evaluation	means	some	factors
		E2	Optimization	means	some	factors
		E3	Optimization+evaluation	means	some	factors
ICSE	AP16	E1	Optimization	single	some	factors
		E2	Evaluation	single	some	factors
		E3	Optimization	single	some	factors
		E4	Optimization	single	some	both
		E5	Evaluation	inferential	some	factors
ICSE	AP17	E1	Optimization	single	some	both
		E2	Evaluation	single	some	factors
		E3	Evaluation	single	some	factors
ICSE'21	AP18	E1	Evaluation	single	some	factors
ICSE'21	AP19	E1	Evaluation	means	some	factors
ICSE'21	AP20	E1	Optimization	single	no	both
		E2	Evaluation	single	some	factors
		E3	Optimization	single	some	factors
ICSE'21	AP21	E1	Evaluation	single	no	factors
ICSE'21	AP22	E1	Optimization	single	some	both
		E2	Evaluation	single	some	factors
		E3	Evaluation	single	some	factors
		E4	Generalization	single	some	factors
		E5	Generalization	single	some	factors
ICSE'21	AP24	E1	Evaluation	single	no	factors
		E2	Evaluation	single	no	factors
		E3	Optimization	single	no	factors
		E4	Optimization	single	no	factors
		E5	Optimization	single	no	factors
		E6	Optimization	single	no	factors
ICSE'21	AP23	E1	Optimization+evaluation	means	some	factors
		E2	Optimization+evaluation	means	some	factors
		E3	Optimization	means	some	factors
		E4	Evaluation	means	some	factors
FSE'18	AP25	E1	Optimization	single	some	none
		E2	Evaluation	means	some	factors
		E3	Evaluation	means	some	factors
FSE'18	AP26	E1	Optimization	single	no	none
		E2	Evaluation	single	no	factors
		E3	Evaluation	single	no	factors
		E4	Evaluation	single	no	factors
FSE'18	AP27	E1	Evaluation	single	no	factors
FSE'18	AP28	E1	Evaluation	single	no	factors
		E2	Evaluation	means	no	factors
		E3	Evaluation	single	no	factors
FSE'19	AP29	E1	Evaluation	means	some	factors
FSE'19	AP30	E1	Optimization	single	no	none
		E2	Evaluation	means	some	factors
		E3	Evaluation	means	some	factors
FSE'19	AP31	E1	Evaluation	single	some	factors
		E2	Optimization	single	some	factors

## Experimental validity

Venue	Paper #	Experiment	Type	Conclusion	Internal	Construct
FSE'19	AP32	E1	Evaluation	inferential	some	factors
		E2	Optimization	inferential	some	factors
		E3	Optimization	inferential	some	factors
FSE'20	AP33	E1	Evaluation	single	some	factors
		E2	Optimization	single	some	factors
		E3	Evaluation	single	no	factors
FSE'20	AP34	E1	Optimization+evaluation	single	some	factors
		E2	Evaluation	single	no	factors
FSE'20	AP35	E1	Optimization	single	no	none
		E2	Optimization+evaluation	inferential	some	factors
FSE'20	AP36	E1	Evaluation	means	some	factors
		E2	Optimization	single	no	factors
		E3	Optimization	single	no	both
		E4	Generalization	single	some	factors
FSE'20	AP37	E1	Optimization	single	no	none
		E2	Optimization	means	some	factors
		E3	Evaluation	single	no	factors
		E4	Generalization	single	no	both
FSE'20	AP38	E1	Optimization	single	no	none
		E2	Evaluation	means	some	factors
		E3	Evaluation	means	some	factors
		E4	Evaluation	means	some	factors
		E5	Evaluation	means	some	factors
		E6	Evaluation	single	no	factors
FSE'21	AP42	E1	Evaluation	single	some	factors
		E2	Optimization	single	some	factors
		E3	Optimization	single	some	factors
FSE'21	AP43	E1	Evaluation	single	some	factors
		E2	Generalization	single	no	both
		E3	Optimization	single	no	factors
		E4	Optimization	single	no	both
FSE'21	AP40	E1	Evaluation	single	no	factors
		E2	Evaluation	single	no	factors
		E3	Optimization	single	no	factors
		E4	Evaluation+Generalization	single	no	factors
		E5	Optimization	means	no	both
FSE'21	AP41	E1	Optimization	single	no	both
		E2	Evaluation	single	some	factors
		E3	Evaluation+Generalization	single	no	factors
		E4	Optimization	single	some	factors
		E5	Optimization	single	no	factors
		E6	Optimization	single	no	factors
		E7	Optimization	single	some	both
FSE'21	AP44	E1	Evaluation	means	some	factors
FSE'21	AP45	E1	Evaluation	inferential	some	factors
		E2	Optimization	means	some	both
		E3	Generalization	inferential	some	factors
		E6	Generalization	means	some	factors

## Experimental validity

Venue	Paper #	Experiment	Type	Conclusion	Internal	Construct
FSE'21	AP39	E1	Evaluation	single	some	factors
		E2	Evaluation	means	some	factors
		E3	Evaluation	means	some	factors
		E4	Evaluation	means	some	factors
		E5	Evaluation	means	some	factors
		E6	Optimization	single	no	both
		E7	Evaluation	single	no	factors
		E8	Evaluation	means	no	factors
TSE'19	AP46	E1	Optimization	single	no	both
		E2	Evaluation	inferential	some	factors
		E3	Optimization	inferential	some	factors
		E4	Generalization	inferential	some	factors
		E5	Generalization	inferential	some	factors
		E6	Evaluation	inferential	some	factors
TSE'20	AP47	E1	Optimization	single	no	both
		E2	Evaluation	means	some	factors
		E3	Evaluation	means	some	factors
		E4	Generalization	means	some	factors
TSE'20	AP48	E1	Optimization	single	no	both
		E2	Optimization	single	no	both
		E3	Evaluation	inferential	some	factors
		E4	Evaluation	inferential	some	factors
		E5	Evaluation	inferential	some	factors
		E6	Evaluation	inferential	some	factors
TSE'20	AP49	E1	Optimization	single	no	both
		E2	Evaluation	single	some	factors
		E3	Evaluation	single	some	factors
		E4	Evaluation	inferential	some	factors
TSE'21	AP50	E1	Evaluation	means	some	factors
		E2	Evaluation	means	some	factors
		E3	Optimization	means	some	both
		E4	Evaluation	single	no	factors
		E5	Optimization	means	no	both
TSE'21	AP51	E1	Optimization	single	some	both
		E2	Evaluation	single	some	factors
		E3	Optimization	single	some	factors
TSE'21	AP52	E1	Evaluation+Optimization	means	some	factors
		E2	Evaluation+Optimization	means	some	factors
		E3	Evaluation+Optimization	means	some	factors
		E4	Generalization	inferential	some	factors
		E5	Generalization	means	some	factors
		E6	Generalization	means	some	factors
TSE'21	AP55	E1	Evaluation	means	some	factors
		E2	Generalization	means	some	factors
		E3	Generalization	means	some	factors
TSE'21	AP54	E1	Evaluation	single	no	factors
		E2	Generalization	single	some	factors

Experimental validity

Venue	Paper #	Experiment	Type	Conclusion	Internal	Construct
TSE'21	AP53	E1	Evaluation	inferential	some	factors
		E2	Optimization	inferential	some	factors
		E3	Generalization	means	some	both
		E4	Optimization	means	some	both