

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% |

| Venue | Paper # | Experiment | Туре | Conclusion | Internal | Construct |
|-------|---------|------------|--------------------------|----------------------------|----------|-----------|
| | | E1 | Optimization | single | no | factors |
| ICSE | AP1 | E2 | Evaluation | single | some | factors |
| | API | E3 | Generalization | means | some | factors |
| | | E4 | Generalization | inferential | no | factors |
| ICSE | AP2 | E1 | Evaluation | inferential | no | factors |
| | | E1 | Evaluation | single | some | factors |
| ICSE | AP3 | E2 | Evaluation | single | some | factors |
| | | E3 | Evaluation | single | some | factors |
| | 454 | E1 | Optimization | single | no | both |
| ICSE | AP4 | E2 | Evaluation | single | no | factors |
| | | E1 | Optimization+evaluation | single | no | factors |
| | | E2 | Evaluation | single | no | factors |
| ICSE | AP5 | E3 | Evaluation | single | no | factors |
| | | E4 | Optimization | single | no | none |
| | | E1 | Optimization | means | no | both |
| | | E2 | Generalization | means | some | factors |
| ICSE | AP6 | E3 | Generalization | means | some | factors |
| | 7 0 | E4 | Generalization | means | some | factors |
| | | E5 | Evaluation | single | no | factors |
| | | E1 | Optimization | single | no | both |
| ICSE | AP7 | E2 | Evaluation | single | some | factors |
| ICSE | Al / | E3 | Generalization | single | no | factors |
| | | E1 | Evaluation | single | no | factors |
| | | E2 | Evaluation | single | no | factors |
| ICSE | AP8 | E3 | Optimization | single | | factors |
| | | E4 | · | _ | no | factors |
| | | E1 | Optimization Evaluation | single single | no | factors |
| ICSE | AP9 | E2 | Optimization | _ | no | factors |
| | | E1 | Optimization | single single | no no | factors |
| | | E2 | Evaluation | inferential | | factors |
| ICSE | AP10 | E3 | Evaluation | | some | |
| | | | | means | some | factors |
| | | E4 E1 | Optimization Evaluation | means | some | factors |
| ICSE | AP11 | E2 | Evaluation | inferential inferential | no | factors |
| | | E2 E1 | | | no | factors |
| | | | Evaluation | single | some | factors |
| ICSE | AP12 | E2 | Generalization | means | some | factors |
| | | E3 | Generalization | means | some | factors |
| | | E4 | Optimization | single | some | factors |
| | | E1 | Optimization | means | some | both |
| ICCE | A D4 2 | E2 | Evaluation | means | some | factors |
| ICSE | AP13 | E3 | Evaluation | means | some | factors |
| 1 | | E4 | Optimization | means | some | factors |
| ļ | | E5 | Optimization | means | some | factors |
| | 454.5 | E1 | Optimization | single | some | both |
| ICSE | AP14 | E2 | Evaluation | single | some | factors |
| | | E3 | Optimization | single | no | factors |

| Venue | Paper # | Experiment | Туре | Conclusion | Internal | Construct |
|---------|---------|------------|-------------------------|-------------|----------|-----------|
| | | E1 | Optimization+evaluation | means | some | factors |
| ICSE | AP15 | E2 | Optimization | means | some | factors |
| | | E3 | Optimization+evaluation | means | some | factors |
| | | E1 | Optimization | single | some | factors |
| | | E2 | Evaluation | single | some | factors |
| ICSE | AP16 | E3 | Optimization | single | some | factors |
| | | E4 | Optimization | single | some | both |
| | | E5 | Evaluation | inferential | some | factors |
| | | E1 | Optimization | single | some | both |
| ICSE AP | AP17 | 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 |
| | | E1 | Optimization | single | no | both |
| ICSE'21 | AP20 | E2 | Evaluation | single | some | factors |
| | | E3 | Optimization | single | some | factors |
| ICSE'21 | AP21 | E1 | Evaluation | single | no | factors |
| | | E1 | Optimization | single | some | both |
| | | E2 | Evaluation | single | some | factors |
| ICSE'21 | AP22 | E3 | Evaluation | single | some | factors |
| | | E4 | Generalization | single | some | factors |
| | | E5 | Generalization | single | some | factors |
| | | E1 | Evaluation | single | no | factors |
| | | E2 | Evaluation | single | no | factors |
| ICSE'21 | AP24 | E3 | Optimization | single | no | factors |
| 1002 21 | | E4 | Optimization | single | no | factors |
| | | E5 | Optimization | single | no | factors |
| | | E6 | Optimization | single | no | factors |
| | | E1 | Optimization+evaluation | means | some | factors |
| ICSE'21 | AP23 | E2 | Optimization+evaluation | means | some | factors |
| | | E3 | Optimization | means | some | factors |
| | | E4 | Evaluation | means | some | factors |
| | | E1 | Optimization | single | some | none |
| FSE'18 | AP25 | E2 | Evaluation | means | some | factors |
| | | E3 | Evaluation | means | some | factors |
| | | E1 | Optimization | single | no | none |
| FSE'18 | AP26 | E2 | Evaluation | single | no | factors |
| F3E 18 | APZU | E3 | Evaluation | single | no | factors |
| | | E4 | Evaluation | single | no | factors |
| FSE'18 | AP27 | E1 | Evaluation | single | no | factors |
| | | E1 | Evaluation | single | no | factors |
| FSE'18 | AP28 | E2 | Evaluation | means | no | factors |
| | | E3 | Evaluation | single | no | factors |
| FSE'19 | AP29 | E1 | Evaluation | means | some | factors |
| J = 10 | | E1 | Optimization | single | no | none |
| FSE'19 | AP30 | E2 | Evaluation | means | | factors |
| . 32 13 | A 30 | E3 | Evaluation | | some | |
| | | | | means | some | factors |
| FSE'19 | AP31 | E1 | Evaluation | single | some | factors |
| | | E2 | Optimization | single | some | factors |

| Venue | Paper # | Experiment | Туре | Conclusion | Internal | Construct |
|--------|-------------|------------|---------------------------|------------------|------------|--------------------|
| | | E1 | Evaluation | inferential | some | factors |
| FSE'19 | AP32 | E2 | Optimization | inferential | some | factors |
| | | E3 | Optimization | inferential | some | factors |
| | | E1 | Evaluation | single | some | factors |
| FSE'20 | AP33 | E2 | Optimization | single | some | factors |
| | | E3 | Evaluation | single | no | factors |
| ECE!30 | FSE'20 AP34 | E1 | Optimization+evaluation | single | some | factors |
| F3E 20 | | E2 | Evaluation | single | no | factors |
| FCFI20 | | E1 | Optimization | single | no | none |
| FSE'20 | AP35 | E2 | Optimization+evaluation | inferential | some | factors |
| | | E1 | Evaluation | means | some | factors |
| | | E2 | Optimization | single | no | factors |
| FSE'20 | AP36 | E3 | Optimization | single | no | both |
| | | E4 | Generalization | single | some | factors |
| | | E1 | Optimization | single | no | none |
| FOELGA | 4 55- | E2 | Optimization | means | some | factors |
| FSE'20 | AP37 | E3 | Evaluation | single | no | factors |
| | | E4 | Generalization | single | no | both |
| | | E1 | Optimization | single | no | none |
| | | E2 | Evaluation | means | some | factors |
| | | E3 | Evaluation | means | some | factors |
| FSE'20 | AP38 | E4 | Evaluation | means | some | factors |
| | | E5 | Evaluation | means | some | factors |
| | | E6 | Evaluation | single | no | factors |
| | | E1 | Evaluation | single | some | factors |
| FSE'21 | AP42 | E2 | Optimization | single | some | factors |
| | | E3 | Optimization | single | some | factors |
| | | E1 | Evaluation | single | some | factors |
| FSE'21 | AP43 | E2 | Generalization | single | no | both |
| F3E 21 | AI 43 | E3 | Optimization | single | no | factors |
| | | E4 | Optimization | single | no | both |
| | | E1 | Evaluation | single | no | factors |
| | | E2 | Evaluation | single | no | factors |
| FSE'21 | AP40 | E3 | Optimization | single | no | factors |
| | | E4 | Evaluation+Generalization | single | no | factors |
| | | E5 | Optimization | means | no | both |
| | | E1 | Optimization | single | no | both |
| | | E2 | Evaluation | single | some | factors |
| FSE'21 | AP41 | E3 | Evaluation+Generalization | single | no | factors |
| FJL ZI | WL#1 | E4 E5 | Optimization Optimization | single single | some no | factors factors |
| | | E6 | Optimization | single | no | factors |
| | | E7 | Optimization | single | some | both |
| FSE'21 | AP44 | E1 | Evaluation | means | some | factors |
| | , 41 -T-T | E1 | Evaluation | inferential | some | factors |
| | _ | E2 | Optimization | means | some | both |
| FSE'21 | AP45 | E3 | Generalization | inferential | some | factors |
| | | E6 | Generalization | means | some | factors |
| | | בט | Generanzation | means | some | ractors |

| Venue | Paper # | Experiment | Туре | Conclusion | Internal | Construct |
|--------|---------|------------|-------------------------|-------------|----------|-----------|
| | | E1 | Evaluation | single | some | factors |
| | | E2 | Evaluation | means | some | factors |
| | | E3 | Evaluation | means | some | factors |
| FSE'21 | A D20 | E4 | Evaluation | means | some | factors |
| F3E 21 | AP39 | E5 | Evaluation | means | some | factors |
| | | E6 | Optimization | single | no | both |
| | | E7 | Evaluation | single | no | factors |
| | | E8 | Evaluation | means | no | factors |
| | | E1 | Optimization | single | no | both |
| | | E2 | Evaluation | inferential | some | factors |
| | | E3 | Optimization | inferential | some | factors |
| TSE'19 | AP46 | E4 | Generalization | inferential | some | factors |
| | | E5 | Generalization | inferential | some | factors |
| | | E6 | Evaluation | inferential | some | factors |
| | | E1 | Optimization | single | no | both |
| | | E2 | Evaluation | means | some | factors |
| TSE'20 | AP47 | E3 | Evaluation | | some | factors |
| | | E4 | | means | | |
| | | | Generalization | means | some | factors |
| | | E1 | Optimization | single | no | both |
| | AP48 | E2 | Optimization | single | no | both |
| TSE'20 | | E3 | Evaluation | inferential | some | factors |
| | | E4 | Evaluation | inferential | some | factors |
| | | E5 | Evaluation | inferential | some | factors |
| | | E6 | Evaluation | inferential | some | factors |
| | | E1 | Optimization | single | no | both |
| TSE'20 | AP49 | E2 | Evaluation | single | some | factors |
| 132 20 | | E3 | Evaluation | single | some | factors |
| | | E4 | Evaluation | inferential | some | factors |
| | | E1 | Evaluation | means | some | factors |
| | | E2 | Evaluation | means | some | factors |
| TSE'21 | AP50 | E3 | Optimization | means | some | both |
| | | E4 | Evaluation | single | no | factors |
| | | E5 | Optimization | means | no | both |
| | | E1 | Optimization | single | some | both |
| TSE'21 | AP51 | E2 | Evaluation | single | some | factors |
| | | E3 | Optimization | single | some | factors |
| | | E1 | Evaluation+Optimization | means | some | factors |
| | | E2 | Evaluation+Optimization | means | some | factors |
| TSE'21 | AP52 | E3 | Evaluation+Optimization | means | some | factors |
| | | E4 | Generalization | inferential | some | factors |
| | | E5 | Generalization | means | some | factors |
| | | E6 | Generalization | means | some | factors |
| TOFICA | A DE - | E1 | Evaluation | means | some | factors |
| TSE'21 | AP55 | E2 | Generalization | means | some | factors |
| | | E3 | Generalization | means | some | factors |
| TSE'21 | AP54 | E1 | Evaluation | single | no | factors |
| .01 -1 | | E2 | Generalization | single | some | factors |

| Venue | Paper # | Experiment | Туре | Conclusion | Internal | Construct |
|--------|---------|------------|----------------|-------------|----------|-----------|
| | | E1 | Evaluation | inferential | some | factors |
| TSE'21 | AP53 | E2 | Optimization | inferential | some | factors |
| | AP33 | E3 | Generalization | means | some | both |
| | | E4 | Optimization | means | some | both |