**Supplementary**

## Statistical Analyses – Technical details

***Principal component analysis/ exploratory factor analysis***

We analyzed physicists’ answers by principal component analysis (PCA), an unsupervised learning method that is popular in the analysis of psychological data to describe the questionnaire’s structure and dimensionality. We performed PCA with singular value decomposition and data centering and used promax rotation to facilitate their interpretation of factor loadings. As a control analysis, we also employed exploratory factor analysis with maximum likelihood estimation and promax rotation with the same objective. Factor analysis is a method that is conceptually similar to PCA and more commonly used to estimate latent psychological variables.

***k-means clustering***

We analyzed physicists’ answers by a k-means clustering algorithm to create a typology of physicists regarding their philosophical position. We used the squared Euclidian distance as a scoring function and derived the optimal number of clusters with the gap-statistic for solutions from 1 to 10 clusters. We repeated the analysis 10,000 times to identify a potentially optimal clustering solution.

***Further statistical analyses***

We performed group comparisons between all clusters for the demographic variables and opinion on building a bigger particle collider (Q26). Further, we aimed to assess how demographic variables relate to an overall degree of scientific realism. As a proxy for a participant’s degree of inclination towards scientific realism, we used the mean score of the 22 questions that aimed to assess scientific realism or instrumentalism. Before that, we aligned all questions in the same conceptual direction, i.e. that higher values indicated inclination towards scientific realism. We tested categorical data with the Approximative Pearson Chi-Squared Test using the ‘coin’ package in R software with 10,000 permutations, and, due to skewed data, non-categorical data with the non-parametric Kruskal-Wallis test. In the case of a significant omnibus test, we performed posthoc comparisons with a Bonferroni-Holm correction.

## Results of the principal components analysis and factor analysis

The principal components analysis (PCA) of the physicists’ answers to all 29 questions found a first factor that explained 27.6% of the variance, followed by nine factors that explained each between 7.9% and 3.0% of the variance. The first ten factors accumulatively explained only 69.3% of the variance. Hence, we did not find a low-dimensional variable space that satisfyingly explained the data. Accordingly, the determination of the number of factors to retain was not straightforward. A qualitative evaluation of the Scree plot suggested two factors, the Kaiser criterion nine. Given the discrepancy, we performed an additional Horn parallel analysis that suggested three factors. We chose the latter solution as it is based on an objective statistical procedure and provides a compromise between the other suggestions. The rotated coefficients (see online materials for details), however, did not give rise to an intuitive and meaningful interpretation of the factors.

Therefore, we additionally investigated the set of only 22 questions that assessed the instrumentalism versus scientific realism position, i.e., a part of the questionnaire that should be better explainable with few variables due to higher conceptual consistency. The results of the PCA were not markedly different. The first factor explained 32.1% of the variance, followed by nine factors that explained between 8.1% and 3.0% of the variance. The first ten factors explained an accumulated variance of 78.1%. Horn analysis suggested two factors. This time, the rotated solution suggested a to some degree meaningful interpretation. The first factor loaded highly on S1, S10, S15, and S21, and it loaded positively on all factors except S16 and S25. Therefore, this factor might broadly represent a participant’s inclination towards scientific realism. However, we failed to identify a meaningful and unifying concept behind the set of items with the highest loadings. The second rotated factor, with the highest loadings on S9, S16, S23, and S25, loaded highest on questions that were formulated to cover a typical instrumentalist position. Still, the first two factors only explained 40.2% of the variance, and with the unsatisfyingly meaningful interpretation, the rotated PCA did not markedly deepen our understanding of the philosophical stances of physicists. The factorial analysis ran into the same problem, which was not surprising given the conceptual similarities with PCA. The variance explained by the extracted factors was critically low (always <50%), so that, according to common guidelines, interpretation of the factors was not appropriate.

Further, we repeated the same analysis, i.e. an unrotated PCA on 22 items, on the philosophers’ answers. This resulted in a very similar first factor, which further increased the confidence in this interpretation of the factor. Interestingly, for philosophers, the first factor explained 47.6% of variance, compared to 32.1% for physicists.

In summary, the use of PCA on the questionnaire data only provided limited insights into the fundamental factors underlying the physicists’ philosophical positions. A general stance on the realism continuum, as well as, to a smaller degree, the stance on an instrumentalism continuum, appear to be fundamental to a physicist’s philosophical position. Still, the vast majority of the variance remains unexplained by these factors, and we found no means to describe this variance with a low-dimensional variable space. Hence, the physicists’ positions appear to be highly complex and heterogeneous.

***Additional table***

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|  | **Experimental physicists** | **Theoretical physicists** |
| **# participants** | **171** | **212** |
| S1 REAL | 66.3 | 63.8 |
| S2 REAL | 80.5 | 78.4 |
| S3 INST | 40 | 39.1 |
| S4 ER | 80.8 | 80 |
| S5 FICT | 27.8 | 31.2 |
| S6 REAL | 73.1 | 70.5 |
| S7 CONST | 47.9 | 45.3 |
| S8 REAL | 71.7 | 75.7 |
| S9 INST | 50.3 | 42.7 |
| S10 REAL | 47.9 | 51.6 |
| S11 MR | 80 | 74.3 |
| S12 INST, PMI | 51.1 | 51.5 |
| S13 ER | 85.8 | 85 |
| S14 ER, MR | 79.6 | 76.8 |
| S15 ER, MR | 76.3 | 72.3 |
| S16 IR | 45.1 | 43.4 |
| S17 ER, IR | 87.3 | 86.5 |
| S18 ER | 81.5 | 79.7 |
| S19 ER, PLUR | 73.6 | 72.7 |
| S20 REAL | 71.2 | 67.6 |
| S21 REAL | 72.5 | 68.8 |
| S22 REAL | 81.1 | 82.9 |
| S23 INST | 41.2 | 34.1 |
| S24 REAL, PLUR | 61.6 | 63.3 |
| S25 PLUR | 43.5 | 43.2 |
| S26 LHC | 52.6 | 57 |
| S27 STRUC | 52.8 | 56.7 |
| S28 PLUR | 79 | 79.1 |
| S29 PERSP | 55.5 | 55.6 |
| S30 PERSP | 63.9 | 68.1 |

Table 5: Comparison between experimental and theoretical physicists for all statements.. The numbers indicate the mean values of agreement for each group. In the first column, we abbreviate the tested philosophical position in the following way: scientific realism (REAL), entity realism (ER), metaphysical realism (MR), internal realism (IR), instrumentalism (INST), fictionalism (FICT), constructivism (CONST), perspectivism (PERSP), pluralism (PLUR), and structural realism (STRUC), pessimistic meta-induction (PMI).