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# Do Strategic Research Agendas change over time?

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## Abstract

Strategic Research Agendas (SRAs) play a crucial role in shaping research behaviors, conceptions of science, and scientific productivity, yet their dynamic nature over time remains underexplored. This study investigates whether SRAs are static or dynamic and the extent to which institutional and individual factors may affect these orientations. Drawing on a longitudinal dataset of survey responses from 2,337 researchers across all fields of science, we explore whether these researchers' SRAs shifted over a 6-year span. Using cluster analysis and logistic regression, we analyzed the data and found that SRAs are dynamic, changing over time, albeit slowly. Two broad archetypal shifts were identified: from Cohesive (consolidative) to Trailblazing (innovative) agendas, and vice-versa. Key drivers of these shifts include increased social satisfaction, positively associated with Trailblazing agendas, and higher levels of institutional unconstraint (i.e., the freedom to focus solely on research), associated with a reduced likelihood of adopting Trailblazing agendas. Disciplinary differences also emerged, with researchers in the Natural, Agricultural, Medical, and Health Sciences more likely to shift toward Trailblazing agendas than those in the Social Sciences and Humanities. Female researchers were also less likely to transition to Trailblazing agendas than their male counterparts, suggesting persistent gendered patterns in science.

**Keywords:** Strategic Research Agendas; change over time; institutional and individual factors; scientific profiles

## Introduction

Science constantly evolves and changes. As in the past, scientific systems at global and national levels have undergone significant changes in recent decades regarding structure, diversification, specialization, the redefinition of centers and peripheries, and participation (Baker et al., 2025). Researchers from developing countries are increasingly participating in global science, with important reforms underway to sustain and expand knowledge activities, while Asian countries, particularly China, are gaining relevance in global science (Marginson & Xu, 2023). However, the difference between the past and present lies in the accelerated pace of change, which has made scientific development more cumulative, participatory, and large-scale than ever before (Spear, 2004). This shift is driven by global competitiveness based on knowledge-intensive economies, rapid technological innovations, accelerated knowledge cycles, and the inherently dynamic nature of science (Marginson, 2022). A reflection of this is that professions associated with science are also constantly changing, driven not only by changing public policies, funding regimes, and collaboration-productivity dynamics but also by technological innovations and Artificial Intelligence that affect scientific work, outputs, and outcomes (Koçak & Akçalı, 2025). Changes in science have also been linked to changes in academia, which has become more research-oriented since the mid-20th century. Increased performance expectations, greater accountability, and intense competition for resources have led to transformations in academic work environments, particularly in academic research (Horta, 2022).

In this context, research agendas are central to scientific activity, significantly shaping scholarly endeavors and influencing career trajectories in multiple ways; they were found to be associated with thinking styles, research conceptions, and satisfaction (e.g., Zhang & Horta, 2023). Empirical studies have found that the strategic research agenda (SRA) guides researchers' selection of topics, methodologies, and theoretical approaches, impacting individual careers and broader scientific fields (Horta & Santos, 2020). SRAs have been identified as dynamic constructs affected by institutional contexts, individual aspirations, and external socio-academic environments (Horta & Santos, 2019; Santos, 2023). Studies have also found that SRAs can be broadly grouped into Trailblazing agendas, which focus on innovative, cutting-edge topics, and Cohesive agendas, which focus more on the consolidation of existing science (Santos & Horta, 2018). This duality reflects the classic dynamic of science: Trailblazing agendas pursue innovative, novel, or disruptive topics and methodologies, aligning with Kuhn's (2012) concept of extraordinary science, while Cohesive agendas focus on consolidating and refining existing knowledge, paralleling his concept of normal science.

Considering the ongoing changes in science and academia, it is reasonable to assume that SRAs may also be fluid. This assumption is underscored by the fact that researchers tend to conform and adapt to the systemic and institutional structures in which they develop their work (Long & McGinnis, 1981; Santos, 2023). For example, researchers tend to be more productive in research-intensive institutions due to adaptation to context, access to resources, and response to institutional incentives. Additionally, their productivity across life and professional trajectories is bound to change and adapt, suggesting an adaptation to both time and context (Kwiek & Szymula, 2025).

Although SRAs have thus far been analyzed only using cross-sectional datasets from a single point in time, there are suggestions that time plays a role in the findings. A study on the effect of SRAs on research productivity in the social sciences found a limited short-term association (3 years) between SRAs and research productivity and visibility, but this association became apparent and stronger when a long-term perspective (i.e., career) was considered. In the long term, SRAs were found to be significantly associated with the number of publications and citations (Santos et al., 2022). A further study assessing the research agenda settings of higher education researchers found that time may influence the PhD mentor's impact on research agenda definition for younger and older researchers, but for the most part, the characterization of SRAs for younger and older generations was basically the same, suggesting that SRAs tend to be more static than dynamic (Santos & Horta, 2018). Other studies

suggest that SRAs may shift over time, particularly regarding scientific ambition, which may be lower for older academics as they downplay their research ambition, for example, and may be content with their reputation, not aiming for more (Zang & Xie, 2023). Additional research on SRAs found that older female researchers tend to have more Trailblazing-type SRAs compared to younger female researchers, suggesting a time-related shift (Santos et al., 2020).

Although the findings point more towards change, the results are somewhat mixed or inconclusive regarding the broader picture and understanding of the factors affecting SRA change and the impact of SRAs. However, a more important issue with existing studies is that the same researchers are not analyzed at different points in their careers, making it hard to distinguish whether the findings are related to time or cohort effects. This research addresses these issues by assessing the SRAs of the same researchers at two points in time (separated by 6 years) and considering the role that relevant factors may have in the constancy or dynamics of SRAs. Therefore, the goal of this study is to shed light on whether SRAs are static or dynamic over time and, if they change, what factors are associated with such shifts. Specifically, we aim to answer three research questions: RQ1: Do SRAs change over time?; RQ2: Can researchers be classified based on the overall direction of the SRA shift?; and RQ3: What factors contribute to these shifts?

In the following section, we describe the methods employed in this study. Following this, we present the analyses and conclude with a discussion of the findings and their implications.

## Methods

### *Data Collection*

The primary data source for this study was a survey conducted between 2017 and 2018, in which we contacted corresponding authors from all fields of knowledge who had published between 2010 and 2016. The goal was to collect a global sample that included academics from all fields of science. To ensure disciplinary representativeness and mitigate geographic or visibility-based biases, we conducted a comprehensive series of searches in Scopus, filtering across disciplines and employing multiple sorting options. The identified corresponding authors were then contacted by email and invited to participate in a survey. In that survey, we asked several questions regarding the researchers' SRAs, as well as other relevant information, including demographic, career, and educational data. In that study, the sample size was 12,183 researchers (considering only those with meaningful engagement with the survey). These researchers were contacted again in 2024 and asked the same questions regarding their research agendas, allowing us to determine whether these agendas shifted over time. For this second round, we recruited 3,025 participants, a response rate of 24.82%. Of these, 427 were excluded due to lack of meaningful engagement with the survey (i.e., dropping off after the first page). After merging both datasets, we also excluded 261 participants who had critical, non-imputable missing data in one or more variables of interest in either time period. After considering these exclusions, the final working sample size was 2,337 participants. The effective sample size varies by analysis due to listwise deletion.

In terms of demographics, the average age of participants was 50.74 years (SD = 11.32), with the majority being male (N = 1,623; 69.4%). The sample was global, with the most represented countries being the United States (N = 500; 21.4%), the United Kingdom (N = 127; 5.4%), Italy (N = 189; 8.1%), Spain (N = 120; 5.1%), Canada (N = 104; 4.5%), and Australia (N = 87; 3.7%). In terms of disciplinary distribution, the most represented field was Social Sciences (N = 682; 29.2%), followed by Natural Sciences (N = 573; 24.5%), Medical and Health Sciences (N = 526; 22.5%), Engineering and Technology (N = 408; 17.5%), Agricultural Sciences (N = 84; 3.6%), and Humanities (N = 63; 2.7%).

### *Variables*

This section describes the variables used in this study. Due to the temporal nature of the study, these can be broadly classified as time-variant or time-invariant variables, depending on whether they remained static over time. We begin by describing the time-invariant variables, which are fewer in number.

*Gender* is a dummy variable indicating whether the participant is male or female, with male as the reference category. *Field of Science (FOS)* is a categorical variable based on the Frascati manual classification scheme (OECD, 2002). Due to smaller sample sizes in some fields, Natural Sciences and Agricultural Sciences were merged into a single category, as were Social Sciences and Humanities. The reference category for FOS is Social Sciences and Humanities. *Continent* is a categorical variable indicating the continent in which the participant's institution was located at the first time period, included to account for possible geographical differences in research agenda dynamics. The reference category is South America. *Age* is a continuous variable indicating the participant's age at the first time period. We treat age as time-invariant since the differential between the first and second time periods is identical for all participants, rendering it constant. Using the first period age and treating it as invariant was considered sufficient for controlling relative age differences.

The time-variant variables are more numerous: *publications*, *citations*, *co-authors*, and *h-index* are self-explanatory count variables that draw the researcher's bibliometric profile. These variables are also frequently used in the scientometrics literature (e.g., Kwiek & Szymula, 2025). All were extracted from the Scopus API at both the first and second time periods. *Changed Sector* is a dummy variable indicating whether the participant changed employment sector between the first and second time periods (e.g., shifting from academic to governmental or private sectors). *Changed Institution* is another dummy variable indicating whether the participant changed academic affiliation between the first and second time periods, addressing institutional mobility regardless of whether the change was between sectors or within the same sector.

The next two sets of time-variant variables are somewhat more complex. One set comprises the various dimensions of the Multi-Dimensional Research Agendas Inventory – Revised (MDRAI-R; Horta & Santos, 2020), and the second set comprises the various dimensions of the Multi-Dimensional University Research Workplace Inventory (MDURWI; Santos, 2018). Most of the concepts measured by these instruments are self-explanatory. However, for ease of reading and parsimony, rather than providing textual descriptions of each dimension—as they are numerous—a summary of each is provided in tables. Table 1 summarizes the dimensions of the MDRAI-R, while Table 2 does the same for the MDURWI.

**Table 1:** Dimensions of the MDRAI-R

| *Dimension* | *Definition* |
|---|---|
| Scientific ambition | The desire to acquire recognition and academic prestige in a given field; Being motivated and driven by the publication of scientific articles. |
| Divergence | The desire to expand into other fields of study or topics, and preference for working in multidisciplinary research ventures. |
| Discovery | Preference for working in fields or topics with the potential to lead to scientific discovery. |
| Tolerance to low funding (TTLF) | Willingness to work on fields or topics for which research funding is scarce. |
| Collaboration | Desire to engage in collaborative scientific ventures, and also have the opportunity and receive invitations to participate in collaborative scientific ventures. |

| | |
|---|---|
| Mentor influence | Indicates whether the researcher's mentor (PhD or otherwise) holds a degree of influence over his or her work. |
| Academia Driven | The extent to which the research agenda is influenced by scientific priorities that the field community determines by consensus, and the researchers' propensity to align their research agenda with the research strategic targets of their institution. |
| Society Driven | Measures the incidence of society related challenges in the research agenda and the influence and participation of laymen and non-experts in the design of the research agenda. |

Note: adapted from Horta, Meoli & Santos (2021).

**Table 2:** Dimensions of the MDURWI

| *Dimension* | *Definition* |
|---|---|
| Leadership Satisfaction | Measures how the individual perceives his or her leadership. |
| Belonging | The degree to which the individual identifies with his or her department or Faculty. |
| Willingness to Stay | Measures the extent to which the individual is willing to stay in his or her department or Faculty. |
| Resources | The perceived access (or lack of) to resources, financial or otherwise. |
| Social Satisfaction | Measures how satisfied a researcher is regarding his or her peers and colleagues. |
| Autonomy | The perceived degree of independence the researcher has in his or her workplace. |
| Unconstraint | The absence of institutional pressure or demands to conduct non-research related activities or duties. |

Each dimension is measured by multiple Likert-style items on a 1-7 scale. Full validation exercises for these instruments are available in the respective original works (Horta & Santos, 2020; Santos, 2018).

*Procedure*

Based on the responses from the two surveys, we calculated deltas (differences between the second and first time periods) for all time-variant variables. Most variables used in the subsequent analysis, specifically those plausible to have changed over time, are expressed as these deltas. Other time-invariant variables, such as the field of science of the participant's PhD, were kept static. Following this data preparation stage, we proceeded to the analytical pipeline as follows.

In the first stage, we conducted paired-samples t-tests, comparing each variable across the two time periods. The goal was to determine if SRA scores changed over time, a necessary condition for subsequent analyses. Next, we employed a TwoStep Cluster Analysis (Chiu et al., 2001; Zhang et al., 1996) using the research agenda variables' deltas to identify potential SRA shift trends. This data reduction procedure identified broad archetypical trends for use as the dependent variable in the subsequent step, simplifying the analysis without relevant loss of information. Finally, we conducted a logit regression using the clustering group variable from the previous step as the dependent variable to determine which changes or dimensions led to an overall shift in research agenda. The analysis first assesses a full model, focusing on all researchers in the sample. Two further models were specified: one

for early career researchers (less than 40 years of age at the first time period) and the second for established career researchers (40 or more years at the first time period). These models were added to assess the extent to which researchers in early and late career phases may be more likely to have static or dynamic SRAs and have their SRAs influenced by other factors. This is based on the notion that researchers at different career stages face different constraints, incentives, challenges, and professional perspectives and options (Goel & Göktepe-Hultén, 2020).

## Findings

The findings section is organized around analyses addressing the study's three orienting research questions.

*RQ1 - Do SRAs change over time?*

To address this, we used paired t-tests, comparing each researcher's score at the first time period with their score at the second time period to determine if the values changed over time. The statistical results are presented in Table 3, with a visualization in Figure 1.

**Table 3:** Comparison of agenda scores in the first and second period

| | T1 | | T2 | | | |
|---|---|---|---|---|---|---|
| | M | SD | M | SD | p | N |
| Scientific Ambition | 5.077 | 0.935 | 5.015 | 1.001 | < .001 | 2,336 |
| Divergence | 5.070 | 0.930 | 4.844 | 1.004 | < .001 | 2,336 |
| Discovery | 5.064 | 0.915 | 5.124 | 0.970 | < .001 | 2,336 |
| Mentor Influence | 2.863 | 1.421 | 2.507 | 1.420 | < .001 | 2,107 |
| TTLF | 4.267 | 1.347 | 4.135 | 1.375 | < .001 | 2,330 |
| Collaboration | 5.213 | 0.845 | 5.239 | 0.881 | .080 | 2,336 |
| Academia-Driven | 3.912 | 1.035 | 4.044 | 1.039 | < .001 | 2,335 |
| Society-Driven | 4.023 | 1.149 | 4.052 | 1.163 | .102 | 2,334 |

Notes: p denotes the p-value obtained from a paired t-test.

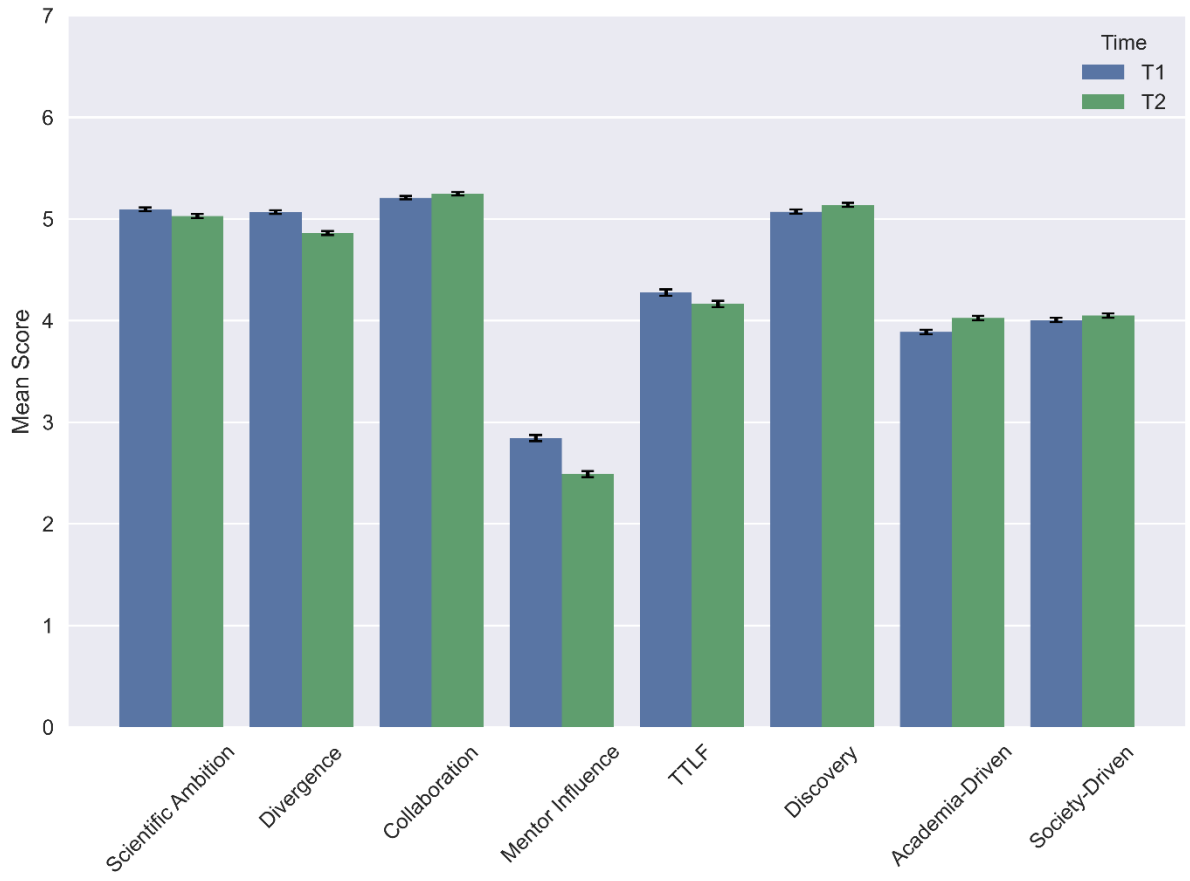



**Figure 1.** Comparison of SRA scores between the first and second time periods. Error bars indicate 95% within-subjects confidence intervals.

The findings show that with the exception of Society-Driven, all SRA dimension scores have changed with high statistical significance, with Collaboration at a higher significance threshold. However, most of these shifts are small in magnitude. The limited time between T1 and T2 may not have been sufficient for more profound shifts, but the presence of less modest effects, such as those for Mentor Influence and Divergence, indicates that research agendas do shift over time.

*RQ2 - Can researchers be classified based on the overall direction of the SRA shift?*

For this analysis, we performed a TwoStep Cluster Analysis using the deltas as input variables. The analysis identified two clusters with a satisfactory silhouette measure of 0.2 for cohesion and separation (Kaufman & Rousseeuw, 2009), a value conventionally described as fair. This warrants an explicit statement of the clustering's purpose and what it is not intended to represent. The purpose of this step is data reduction rather than discovering naturally occurring, well-separated groups. Given that the inputs are eight continuous change scores with an approximately continuous joint distribution, a high silhouette value would not be expected and would, in fact, be surprising. The solution provides a parsimonious and interpretable summary of the dominant axis of variation in the deltas, which is then used as the dependent variable in subsequent regression models.

Two features support this use. First, the two clusters separate consistently along that axis: all eight input dimensions discriminate in the same direction, and the two centroids lie on opposite sides of zero for seven of the eight dimensions (see Table 4). Second, the solution reproduces the Trailblazing-Cohesive distinction established in the SRA literature (Santos & Horta, 2018), rather than imposing an arbitrary structure.

The clusters revealed a readily interpretable structure: one cluster of individuals whose attributes shifted in a more positive direction and another of individuals who shifted in the opposite, more negative direction. Based on previous studies, high scores in the input attributes are associated with the Trailblazing archetype, while lower scores are associated with the Cohesive archetype (Santos & Horta, 2018). The exception is Mentor Influence, for which higher scores are associated with the Cohesive archetype. Academia-Driven and Society-Driven, to our knowledge, have not yet been employed in such an analysis. Thus, given the literature-based context (e.g., Santos et al., 2020), we interpreted the attribute-increasing cluster as comprising researchers who shifted towards a Trailblazing agenda and the attribute-reducing cluster as comprising individuals who shifted towards a Cohesive agenda.

However, it is important to note that these shifts were not all identical in magnitude, and even the largest are only decimal in nature. Thus, while this provides preliminary evidence that research agendas are not lifetime-static attributes, it shows that they shift rather slowly, at least within the roughly six-year timespan between the two data collection exercises. The Trailblazing-shifting cluster comprised 1,217 individuals (57.9%), whereas the Cohesive-shifting cluster comprised 886 individuals (42.1%). These findings are summarized in Table 4.

**Table 4:** Descriptive statistics of the extracted clusters

| | Trailblazer-shifted | | Cohesive-shifted | |
|---|---|---|---|---|
| | M | SD | M | SD |
| Scientific Ambition Delta | 0.27 | 0.68 | -0.52 | 0.83 |
| Divergence Delta | 0.06 | 0.71 | -0.60 | 0.83 |
| Discovery Delta | 0.31 | 0.74 | -0.27 | 0.92 |
| Mentor Influence Delta | 0.02 | 1.08 | -0.87 | 1.35 |
| TTLF Delta | -0.03 | 1.27 | -0.25 | 1.40 |
| Collaboration Delta | 0.28 | 0.63 | -0.32 | 0.73 |
| Academia-Driven Delta | 0.45 | 0.81 | -0.28 | 0.98 |
| Society-Driven Delta | 0.36 | 0.71 | -0.39 | 0.89 |
| N (%) | 1217 (57.9%) | | 886 (42.1%) | |

*RQ3 - What factors contribute to these shifts?*

We conducted a logistic regression with the cluster membership variable as the dependent variable and Cohesive-shifted as the reference category. The results are presented in Table 5.

**Table 5:** Logistic regression with archetype shift as the dependent variable

| | All Researchers (N = 1,707) | | Early Career (N = 338) | | Established Career (N = 1,369) | |
|---|---|---|---|---|---|---|
| Parameter | B (SE) | OR | B (SE) | OR | B (SE) | OR |
| Gender (Female) | -0.205* | 0.815 | 0.689** | 1.993 | -0.420*** | 0.657 |
| | (0.115) | | (0.268) | | (0.130) | |
| FOS (Natural & Agricultural Sciences) | 0.430*** | 1.538 | 1.047*** | 2.850 | 0.355** | 1.427 |
| | (0.150) | | (0.366) | | (0.170) | |
| FOS (Engineering & Technology) | 0.101 | 1.107 | 0.990*** | 2.690 | -0.056 | 0.946 |
| | (0.162) | | (0.379) | | (0.185) | |
| FOS (Medical & Health Sciences) | 0.350** | 1.419 | 0.599 | 1.821 | 0.352* | 1.422 |
| | (0.164) | | (0.365) | | (0.189) | |
| Continent (Africa) | 0.193 | 1.213 | 0.589 | 1.802 | -0.067 | 0.935 |
| | (0.385) | | (1.111) | | (0.434) | |
| Continent (Asia) | 0.009 | 1.009 | 0.700 | 2.014 | -0.284 | 0.753 |
| | (0.251) | | (0.517) | | (0.302) | |
| Continent (Europe) | 0.134 | 1.144 | 0.884** | 2.420 | -0.204 | 0.815 |
| | (0.211) | | (0.434) | | (0.256) | |
| Continent (North America) | -0.074 | 0.929 | 0.418 | 1.520 | -0.321 | 0.725 |
| | (0.223) | | (0.489) | | (0.265) | |
| Continent (Oceania) | -0.011 | 0.989 | 0.820 | 2.271 | -0.256 | 0.774 |
| | (0.308) | | (0.755) | | (0.352) | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Changed sector | -0.065 | 0.937 | 0.034 | 1.034 | -0.115 | 0.891 |
| | (0.107) | | (0.254) | | (0.120) | |
| Changed institution | 0.019 | 1.019 | 0.010 | 1.010 | 0.049 | 1.051 |
| | (0.110) | | (0.273) | | (0.123) | |
| Age | 0.008 | 1.008 | 0.097** | 1.102 | -0.001 | 0.999 |
| | (0.005) | | (0.043) | | (0.007) | |
| Leadership Satisfaction Delta | 0.005 | 1.005 | -0.083 | 0.920 | 0.040 | 1.040 |
| | (0.041) | | (0.101) | | (0.046) | |
| Belonging Delta | -0.031 | 0.970 | 0.079 | 1.083 | -0.050 | 0.951 |
| | (0.053) | | (0.126) | | (0.060) | |
| Willingness to Stay Delta | 0.056 | 1.058 | -0.080 | 0.923 | 0.071 | 1.073 |
| | (0.046) | | (0.115) | | (0.051) | |
| Resources Delta | 0.069 | 1.071 | 0.184* | 1.203 | 0.029 | 1.029 |
| | (0.045) | | (0.102) | | (0.051) | |
| Autonomy Delta | -0.012 | 0.989 | -0.146 | 0.864 | 0.043 | 1.044 |
| | (0.053) | | (0.110) | | (0.063) | |
| Unconstraint Delta | -0.225*** | 0.799 | -0.303*** | 0.739 | -0.217*** | 0.805 |
| | (0.043) | | (0.101) | | (0.049) | |
| Social Satisfaction Delta | 0.521*** | 1.683 | 0.580*** | 1.786 | 0.518*** | 1.679 |
| | (0.072) | | (0.171) | | (0.081) | |
| Publications Delta | 0.002 | 1.002 | 0.001 | 1.001 | 0.002 | 1.002 |
| | (0.001) | | (0.004) | | (0.001) | |
| Citations Delta | -0.000 | 1.000 | 0.000 | 1.000 | -0.000 | 1.000 |
| | (0.000) | | (0.000) | | (0.000) | |
| Co-authors Delta | 0.000 | 1.000 | 0.000 | 1.000 | -0.000 | 1.000 |
| | (0.000) | | (0.000) | | (0.000) | |
| H-index Delta | 0.002 | 1.002 | 0.007 | 1.007 | 0.002 | 1.002 |
| | (0.002) | | (0.005) | | (0.002) | |

Notes: *** p < 0.01; ** p < 0.05; * p < 0.1. Reference category for FOS is “Social Sciences & Humanities”; reference category for Continent is “South America”.

In the full model, few variables show a noticeable association with SRA archetype shifts. However, those that do tend to have large effects. The most significant effects are disciplinary in nature. Compared to the social sciences baseline, researchers from the Natural & Agricultural sciences were roughly 54% more likely to shift towards a Trailblazing agenda (B = 0.430; OR = 1.538; p < .01), with a similar though lesser effect observed for the Medical & Health Sciences, showing a 42% increase in likelihood (B = 0.350; OR = 1.419; p < .05). This trend may relate to internal field dynamics, including greater resources for pursuing blue sky research (Jaffe, 2014). Geography plays no discernible role in the full model, as none of the continent categories show significant associations with archetype shifts, and all effects are small in magnitude, suggesting that SRA changes are not patterned along broad geographical lines.

Increases in Social Satisfaction substantially increase the odds of shifting to a Trailblazing archetype, with a 68.3% increase per unit increase in Social Satisfaction (B = 0.521; OR = 1.683; p < .01). This effect is likely related to increased networking dynamics, which lead to more co-authorship opportunities. This resonates with past findings (Horta & Santos, 2019; Santos, 2023) showing that researchers unhappy with their peers or institutional environment are less likely to engage in collaborative work, discuss research ideas, or receive feedback to improve their research. Higher satisfaction tends to lead to stronger socialization, confidence, and institutional commitment, triggering more collaborative opportunities, some of which may involve Trailblazing research (Abbasi et al., 2011; Santos et al., 2022). However, increasing levels of unconstraint lead to a decrease in the likelihood of shifting towards a Trailblazing agenda, with roughly a 20% decrease per unit increase in Unconstraint (B = -0.225; OR = 0.799; p < .01). Although counter-intuitive, this may be because without stimuli from other activities such as teaching, management, or leadership (Tennant et al., 2009), which provide learning, ideas, and experiences influencing research thinking and design, researchers may prefer to conform to what they know and master rather than pursue more multidisciplinary or ambitious research.

Concerning Gender: female researchers were roughly 19% less likely than male researchers to have shifted to a Trailblazing archetype (B = -0.205; OR = 0.815; p < .1). These findings resonate with previous research suggesting that female researchers are less likely to pursue Trailblazing research (Santos et al., 2020), which may contribute to them receiving fewer citations and having their work be

less visible and recognized (Ross et al., 2022). Given the temporal nature of this study, this may relate to the glass ceiling effect (Bukstein & Gandelman, 2019; Henley, 2015). Although typically associated with career progression, institutions' preference for productivity in terms of raw quantity (Hicks, 2012; Martin, 2011) may create a perverse incentive for female researchers to pursue more conservative research to publish and secure career progression. This may also lead them to publish in less prestigious or visible outlets (Mayer & Rahmann, 2018). This assumption is reasonable considering that female researchers publish less than male researchers throughout their careers (Madison & Fahlman, 2020).

In the full model, none of the bibliometric variables show significant associations with archetype shifts. The effect of the H-Index approaches, but does not reach, conventional significance ($B = 0.002$; $OR = 1.002$; $p = .101$), while publications, citations, and co-authors are all non-significant. This suggests that over the analyzed period, shifts between SRA archetypes are not accompanied by measurable changes in researchers' bibliometric profiles, contrasting with previous studies indicating that such shifts correlate with increasing scientific impact (Yu et al., 2021).

The models for early and established career researchers reveal interesting trends. Several variables remain statistically significant across all models, suggesting they are the most impactful regardless of career stage: Gender, Natural Sciences & Agriculture, Unconstraint, and Social Satisfaction. However, the direction of statistical significance does not always remain the same. For example, established female researchers, similarly to the full model results, are less likely to shift their SRAs towards Trailblazing agendas, though with a greater effect. Established female researchers are 34% less likely than established male researchers to have shifted to a Trailblazing archetype ($B = -0.420$; $OR = 0.657$; $p < .01$). However, early career female researchers exhibit the opposite effect and are almost twice as likely as male early career researchers to have shifted towards a Trailblazing archetype ($B = 0.689$; $OR = 1.993$; $p < .05$). This suggests that younger generations of female researchers tend to focus more on Trailblazing agendas than established researchers, indicating a potential generational change that may mitigate gender gaps in science, as some research indicates through production and citation analyses (Mayer & Rahmann, 2018).

The field of Natural Sciences & Agriculture shows a greater shift towards Trailblazing agendas compared to the baseline of social sciences and humanities across all models. Researchers from the Natural & Agricultural sciences were roughly 43% more likely to have shifted towards a Trailblazing agenda for established career researchers ($B = 0.355$; $OR = 1.427$; $p < .05$), an effect substantially larger for early career researchers ($B = 1.047$; $OR = 2.850$; $p < .01$). This suggests that some fields tend to enforce or stimulate Trailblazing research agendas more than others, regardless of researchers' career stage. For other fields, two results are notable. First, the direction and magnitude of the association for Medical & Health Sciences are essentially the same in the full model and for established career researchers, with a 42% increase in the likelihood of shifting archetypes for established careers ($B = 0.352$; $OR = 1.422$; $p < .1$) and for the full sample ($B = 0.350$; $OR = 1.419$; $p < .05$), though among established career researchers, the effect is only marginally significant. Second, the field of Engineering & Technology shows statistical significance with a large positive effect only for early career researchers ($B = 0.990$; $OR = 2.690$; $p < .01$).

These results show that field knowledge dynamics differ. Researchers in some fields may have the context and disposition to be innovative, multidisciplinary, and collaborative early in their careers, while in others, knowledge may need to be mastered and consolidated for a longer period before riskier and more ambitious SRAs can be established. In this context, age significantly increases the odds of shifting towards a Trailblazing archetype only for early career researchers ($B = 0.097$; $OR = 1.102$; $p < .05$), suggesting that early career researchers need a level of learning, knowledge accumulation, and maturity to engage in riskier, more ambitious, collaborative, and multidisciplinary SRAs. This possibly indicates that much of this likely takes place during the postdoctoral phase or first academic or research job, as many argue this is one of the most innovative periods of researchers' careers (Armbruster, 2008).

Interestingly, age is associated with a shift to a Trailblazing agenda only for early career researchers, with no effect on the full model or established researchers.

The effects of organizational variables remain constant across all models. Increases in Social Satisfaction led to substantial increases in the odds of shifting to a Trailblazing archetype, with a 67.9% increase per unit increase in Social Satisfaction for established career researchers ($B = 0.518$; $OR = 1.679$; $p < .01$) and 78.6% for early career researchers ($B = 0.580$; $OR = 1.786$; $p < .01$). This effect highlights the importance of collegial and positive environments, as well as researchers being in teams or organizational settings with highly competent colleagues who can collaborate and engage in intellectual conversations, exchange ideas, and develop projects (Albert et al., 2018; Bolli & Schläpfer, 2015). Increasing levels of unconstraint lead to a decrease in the likelihood of shifting towards a Trailblazing agenda in all models, with roughly a 20% decrease per unit increase in Unconstraint for established career researchers ($B = -0.217$; $OR = 0.805$; $p < .01$) and a 26% decrease for early career researchers ($B = -0.303$; $OR = 0.739$; $p < .01$). This suggests that researchers focused solely on research work lack exposure to stimuli from other activities, leading them to adopt Cohesive SRAs, which tend to be more conservative, disciplinary, and less collaborative. One further effect specific to early career researchers is that increases in the perception of Resources are marginally associated with a shift towards Trailblazing agendas ($B = 0.184$; $OR = 1.203$; $p < .1$), suggesting that access to means, funding, and infrastructure may weigh more heavily for those still consolidating their research programs.

Regarding geographical distribution, the continent on which researchers are based is largely inconsequential. None of the continent categories reaches statistical significance in either the full model or the established career researcher model, and the magnitude of these effects is consistently small. The one exception concerns early career researchers based in Europe, who are roughly 2.4 times more likely than their South American counterparts (the reference category) to have shifted towards a Trailblazing agenda ($B = 0.884$; $OR = 2.420$; $p < .05$). Since no comparable effect is found for established career researchers or the sample as a whole, this result is best interpreted as a cohort-specific pattern rather than a general geographical divide. It should be interpreted with caution given the uneven distribution of the sample across continents.

Finally, none of the publication-related variables show any statistically significant effect on shifting towards any type of SRAs for early or established career researchers.

**Conclusion**

This study is the first to assess whether SRAs change over time. The findings confirm that they do, though the change tends to be slow, as the period analyzed is relatively short compared to a researcher's entire career. Drawing a parallel with a study on the effect of SRAs on scientific productivity, which found small short-term effects (in that case, 3 years) but substantial long-term effects across a full career, it can be hypothesized that SRAs may change not only constantly but also considerably over longer periods. This finding addresses the paper's first research question.

The second research question was also addressed. The analysis shows that SRAs tend to change in two directions, aligning with archetypes identified in previous research. One archetype, Trailblazing, is characterized by a willingness to broaden research into other fields and topics, engage in multidisciplinary research, participate more in collaborations, and assume greater risks in starting projects with fewer resources or proposing riskier objectives. The other archetype, Cohesive, pertains to mastery and development of knowledge in a given field or topic, reflecting a more disciplinary approach and a preference for specialization over broadness in topicality, theory, and methods. It also involves engagement with less risky projects, fewer collaborations, and conveys stability and a comfort zone. For early career researchers, this archetype may also convey greater dependence on senior researchers (Santos & Horta, 2018). The findings indicate that researchers' SRAs change between these archetypes, with the sample showing a greater proportion shifting towards Trailblazing agendas.

The third research question analyzed the factors associated with these changes. The strongest predictors are the fields of science, with some showing a more pronounced shift towards Trailblazing agendas. Data limitations prevent a full analysis of the underlying reasons, though hypotheses can be proposed. The tendency of researchers in most STEMM fields to adopt Trailblazing agendas may relate to pressures from science and innovation policies in countries that view these fields as critical to social and economic competitiveness, the growing share of competitive research funding allocated to them, and the momentum in these fields to address complex global problems (Becher & Trowler, 2001). Such problems require growing levels of multidisciplinarity, collaboration, work in massive infrastructures and projects (e.g., CERN), and the mostly collective agendas that drive research in these fields, compared to the social sciences and humanities (Baker & Powell, 2024). However, interesting differences between fields of science were identified, which policymakers and research leaders should consider if they aim to further shape research in these fields.

Individual characteristics had mixed results. Age was relevant only for early career researchers, while gender showed different dynamics across the full model and the models for early career and established researchers. Although female researchers are more likely to adopt Cohesive agendas than their male counterparts in both the full model and the established researcher model, early career female researchers appear to adopt Trailblazing agendas more than early career male researchers. This may indicate a future shift in the research paradigm for female researchers, though this must be tempered by the possibility that at this career stage, structural and organizational constraints on female researchers in science (such as the glass ceiling effect; Bukstein & Gandelman, 2019) may not yet affect how they establish their SRAs, research productivity, and visibility. It is possible that although early career female researchers may opt for Trailblazing agendas, they may still adopt more Cohesive agendas later in their careers. However, research by Santos et al. (2020) suggests this may not be the case, though longitudinal studies are needed to confirm this.

Finally, among workplace perspectives, i.e., organizational variables, only two appear consistently critical for adopting SRA archetypes. Social satisfaction tends to incentivize the adoption of Trailblazing agendas, aligning with findings that favorable working climates and competent, collegial colleagues contribute to prolific research productivity and scientific accomplishments (Fox & Nikivincze, 2021). The findings underscore the importance of such environments for nurturing quality and ambitious research. On the other hand, higher levels of unconstraint, i.e., the absence of institutional pressure or demand for researchers to engage in non-research activities, lead to the adoption of Cohesive agendas. Many ideas, inspirations, and solutions for designing research agendas stem from real or social problems. Without the stimuli from engaging in other activities, access to these ideas and inspirations may curtail creativity and the drive to solve such problems. This may be further accentuated by the isolation that can result from focusing solely on research, potentially causing the work to miss out on the benefits of social engagement, communication with others, and peer effects (Albert et al., 2018; Bolli & Schläpfer, 2015). This finding has clear policy implications: researchers should engage in more than just research work, interacting with diverse people and stakeholders to avoid the isolation of the Ivory Tower.

*Limitations*

It is important to acknowledge three limitations of this study. The first is its self-reported nature. Both the research agenda and workplace measures are self-reported and are therefore subject to biases common to all self-report instruments, including social desirability and the tendency of respondents to construct coherent retrospective accounts of their trajectories. However, this limitation is mitigated by two factors: first, the analysis focuses on within-person changes, which levels out stable respondent-level biases; and second, a substantial part of the predictor set (the bibliometric variables, field of science, and mobility indicators) is drawn from external sources rather than self-reports.

Second, the representativeness of the sample with respect to the intended population cannot be assessed, as there is no frame of the global population of researchers against which it could be benchmarked. Although the sample covers all fields of science and multiple world regions, it is a non-probabilistic sample of Scopus-indexed corresponding authors who volunteered to participate in both waves (with a response rate of 24.82% in the second wave). Participants may therefore differ systematically from non-participants, for instance in their engagement with research or in how much their agendas changed, and fields and regions with weaker Scopus coverage, such as the social sciences, the humanities, and non-English-speaking countries, are likely under-represented. The risk of bias is greatest for descriptive estimates, such as the proportion of researchers shifting towards each archetype, which should not be generalized to the population of researchers. It is lower, though not absent, for the estimated associations, which are based on within-person change and are conditional on field of science, region, career stage, and the other controls; bias in these estimates would arise only if selection into the sample were related to both the predictors and the outcome.

Third, missing data could not be handled with methods such as multiple imputation or non-response weighting. Case missingness results from non-response and attrition between waves and from the exclusion of participants who did not engage meaningfully with the survey or who lacked critical data after merging both waves. Item missingness was handled through listwise deletion, since several key variables (e.g., employment data) were optional for privacy reasons and are largely categorical, and no auxiliary information on non-respondents is available to model the missingness. Listwise deletion may produce biased estimates when data are not missing completely at random, an assumption we cannot test. If attrition or item non-response is related to agenda change itself, for example if researchers whose careers changed the most were less likely to respond or to report employment data, the estimates may be biased, and the reduced effective sample sizes also lower statistical power. The findings should therefore be interpreted with these caveats in mind.

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