

Evolving Faces of Scholarship: A 50-Year Diachronic Analysis of Title Construction in Psychology Research Articles (1975–2024)

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ABSTRACT: This diachronic study analyzes 6,959 research article titles from over 80 high-impact psychology journals across five decades (1975–2024). By integrating five dimensions—length, informativity, lexical diversity, syntactic structure, and semantic information—it traces the linguistic maturation of psychophysiology and experimental psychology. Results reveal a statistically significant increase in mean title length (11.55 to 14.93 words) and a modest rise in informativity, while lexical diversity remained remarkably stable ($\approx 95\%$). Compound titles maintained dominance (65.71%), but full-sentence constructions and conclusion-signaling content grew steadily, reflecting a shift toward more explicit result-oriented communication. These patterns underscore the field's adaptation to digital indexing demands and publication pressures, moving decisively beyond traditional brevity guidelines. By establishing clear decade-level baselines, this investigation provides a robust empirical foundation for evaluating the future impact of generative AI on scholarly communication.

KEYWORDS: academic titles, psychology, diachronic analysis, syntactic structure, semantic content, title length

1. INTRODUCTION

The research article title occupies a paradoxically small yet strategically decisive position in academic communication. Functioning simultaneously as a label, an advertisement, and a compressed summary, it shapes whether work is discovered, read, and cited (Hartley, 2005; Swales, 1990). Scholars have described the title as the face of a paper — the reader's first encounter with a study — requiring a careful balance between scientific precision and rhetorical appeal (Lebrun, 2011; Salager-Meyer & Ariza, 2013). As scholarly output grows exponentially, this balancing act becomes increasingly consequential: a well-constructed title may determine whether a study gains visibility or disappears into the literature unread.

Psychology occupies a particularly interesting disciplinary position for title research. Positioned at the intersection of natural and social science, its publication norms have evolved considerably since the mid-twentieth century (Whissell, 2012). As the field expanded from behavioral phenomena into neuroscience, clinical practice, social cognition, and psychophysiology, so too did the conventions governing how research is packaged and presented. Early investigations — most notably Whissell's (2012, 2013) studies of *American Psychologist* and other high-ranking journals — established that psychology titles have grown longer and incorporated more punctuation over time. Yet these studies focused primarily on surface features, leaving deeper structural and semantic dimensions underexplored, particularly in the specialist subfields of psychophysiology and experimental psychology.

The broader landscape of title research — a field sometimes designated "Titrology" following Duchet's (1973) coinage — has generated rich scholarship across multiple disciplines. Foundational cross-disciplinary work by Buxton and Meadows (1977) established that natural science titles tend to be more informative than those in the social sciences, a finding since revisited across linguistics, medicine, astrophysics, ecology, and management (Haggan, 2004; Méndez et al., 2014; Nagano, 2015; Martín & León Pérez, 2024). Diachronic comparisons have revealed systematic shifts in title length, syntactic structure, and informational content, with compound structures rising in prominence and nominal phrases remaining persistently dominant (Xiang & Li, 2020; Sahragard & Meihami, 2016; Li & Xu, 2019). Most recently, Alayyash (2026) extended this multidimensional approach to humanities thesis and dissertation titles, comparing 8,631 MA and PhD titles from ProQuest across 2015 and 2025 along the same five dimensions to assess whether the public release of ChatGPT had measurably reshaped graduate titling practices. Despite this breadth of scholarship, psychology's psychophysiological and experimental branches have rarely been subjected to comprehensive longitudinal title analysis that simultaneously addresses structural, informational, and lexical dimensions — a gap the present study addresses.

The present investigation analyzes 6,959 research article titles drawn from over 80 high-impact psychology journals spanning 1975 to 2024, organized into five successive decades to trace long-term, organic shifts in titling practice. The analytical framework integrates five key dimensions: title length, informativity (proportion of substantive content words), lexical diversity (Type-Token

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Ratio), syntactic structure (compound, nominal, full-sentence, prepositional, and V-ing phrase), and semantic information types (Topic, Method, Dataset, Result, and Conclusion). Together, these dimensions provide a multifaceted portrait of how psychology researchers have encoded their work in titles across nearly half a century — examined simultaneously within a single corpus, distinguishing this study from prior work that has typically addressed one or two variables in isolation.

Understanding how titling norms evolve in psychology illuminates broader processes of disciplinary maturation, the influence of publication pressure on scholarly communication, and the ways in which discourse communities signal methodological and theoretical commitments through their linguistic choices. The five decades under examination capture psychology's transition through major paradigmatic shifts — from behaviorism to the cognitive revolution, from paper-based to digital-database retrieval, and from relatively isolated to increasingly collaborative and interdisciplinary subfields (Whissell, 2012, 2013). By mapping these transitions systematically, the study contributes original empirical evidence to an underserved corner of the title literature and provides a disciplinary baseline against which future studies — including those investigating the potential impact of generative AI on academic writing — may be compared. To guide the analysis, the following research questions were addressed:

1. How have the length, informativity, and lexical diversity of psychology research article titles changed across the five decades from 1975 to 2024?
2. To what extent have the syntactic structure and semantic information types (Topic, Method, Dataset, Result, Conclusion) in psychology titles evolved over the same period?

2. LITERATURE REVIEW

Scholarly attention to the functions of academic titles has grown substantially since Swales (1990) positioned them as both "front matter and summary matter." This dual role places unique demands on title authors, who must compress an entire study into a few words while satisfying the indexing requirements of academic databases. Hartley (2005) distinguished between titles designed to attract and those designed to inform, arguing that the most effective titles accomplish both simultaneously, while Gesuato (2008) observed that titles actively "name, represent, and promote" their associated texts. In psychology, this communicative pressure is particularly acute: the APA Publication Manual's guideline of approximately twelve words reflects institutional recognition of the tension between informativeness and concision (Hallock & Bennett, 2020), yet empirical research consistently shows that psychology titles have exceeded this limit and continued lengthening (Whissell, 2012). Notably, Hallock and Bennett (2020) demonstrated experimentally that reader preferences align with actual titling trends — longer titles and colon-divided structures were actively favored — suggesting that authors' choices and audience expectations have co-evolved.

One of the most consistently documented findings in title research is the tendency for academic titles to grow longer across a wide range of disciplines (Lewison & Hartley, 2005; Méndez et al., 2014). This trend reflects the increasing complexity of research designs, the expansion of knowledge requiring greater specificity, and the growing prominence of digital retrieval systems that incentivize keyword-rich titles (Hyland & Zou, 2022; Martín & León Pérez, 2024). Cross-disciplinary comparisons have generally found that natural science titles are longer than those in the social sciences, though Hyland and Zou (2022) reported that applied linguistics and history titles exceed those in mathematics and engineering — suggesting that disciplinary conventions mediate this relationship in nuanced ways. Within psychology, Whissell (2012) documented a clear upward trend in title length across American Psychologist's sixty-five-year run, and Whissell (2013) confirmed comparable growth in seven high-ranking multidisciplinary psychology journals between 1966 and 2011. Hallock and Bennett (2020) further demonstrated experimentally that psychology readers significantly preferred longer titles and colon-divided structures over equivalent non-compound alternatives, providing a demand-side explanation for bibliometrically documented supply-side trends.

The syntactic organization of research article titles has attracted sustained scholarly attention, with studies consistently identifying nominal phrases as the dominant structural form across disciplines and genres (Wang & Bai, 2007; Moattarian & Alibabae, 2015; Soler, 2007). Nominal constructions are favored for their compactness and capacity to foreground key concepts without grammatical overhead. However, the prevalence of compound titles — divided into two segments by a colon or other punctuation — has grown markedly, particularly in the humanities and social sciences (Hartley, 2007; Hyland & Zou, 2022; Chen & Liu, 2023). The compound structure allows authors to combine a general or attention-catching element with a more specific descriptive clause, simultaneously satisfying the competing demands of appeal and precision (Haggan, 2004). In psychology, Dillon's (1982) early observation that colon usage functions as a "correlate of scholarship" has been repeatedly supported empirically, and Whissell (2012) documented a steady rise in punctuation-mediated compound forms over the twentieth century. Hallock and Bennett (2020) confirmed experimentally that psychology readers significantly prefer colon-divided titles, providing direct empirical support for their sustained dominance. Full-sentence titles and V-ing phrase constructions have also been documented — the former more common in results-reporting fields such as medicine (Goodman et al., 2001), the latter increasingly used in linguistics to signal active inquiry (Xiang & Li, 2020).

Beyond their formal properties, titles encode different types of disciplinary information, and the choice of what to include is itself a meaningful rhetorical act. Goodman et al. (2001) developed an influential framework classifying medical journal title content into

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Topic, Method, Result, and Conclusion categories, since adapted across applied linguistics (Sahragard & Meihami, 2016), pragmatics (Li & Xu, 2019), and astrophysics (Méndez et al., 2014). Sahragard and Meihami (2016) found that Method and Design information dominated consistently across four decades of applied linguistics journals, while Topic, Result, and Dataset elements fluctuated and Conclusion-signaling declined. Li and Xu (2019), analyzing the *Journal of Pragmatics* (1978–2018), similarly observed rising Method-related information alongside a sustained preference for compound structures. Martín and León Pérez (2024), examining biomedical titles from 1940 to 2023, documented a shift from nominal topic-indicating titles toward verbal constructions explicitly announcing results and conclusions — reflecting the growing promotional orientation of academic publishing. Whether psychology has followed this biomedical trajectory toward greater result and conclusion explicitness, or has maintained a more conservative topic-centered stance, is an empirical question the present analysis addresses directly.

Informativity — the proportion of substantive words relative to total word count — was first systematically examined by Buxton and Meadows (1977), who found natural science titles more informative than social science counterparts. Subsequent work confirmed that informativity tends to increase over time as titles grow longer and incorporate more technical terminology (Nagano, 2015; Xiang & Li, 2020). Lexical diversity, operationalized as the Type-Token Ratio (TTR), captures a different dimension: the richness and variety of vocabulary employed in titles. Its application to titles is generally considered robust given the narrow and comparable length ranges of the genre (Bérubé et al., 2018). Research in linguistics has found that lexical diversity tends to decline slightly over time, likely reflecting growing terminological standardization (Xiang & Li, 2020). Psychology, however, presents a more complex case: Whissell, Abramson, and Barber (2013) documented "cognitive creep" — a progressive displacement of behavioral vocabulary by cognitive and mentalist terminology from the 1980s onward — representing a dynamic lexical shift rather than convergence on stable terminology. Whether this ongoing terminological enrichment sustains high lexical diversity in experimental and psychophysiological psychology titles remains an open question the present study examines across five decades. Much of the theoretical scaffolding for title research draws on Biglan's (1973) framework distinguishing disciplines along two axes: hard versus soft (degree of paradigmatic consensus) and pure versus applied (degree of practical orientation). Hard-pure fields such as physics are predicted to favor short, abstract, information-dense titles, while soft-applied fields are expected to produce longer, more contextually elaborated formulations (Buxton & Meadows, 1977; Soler, 2007; Méndez et al., 2014). Psychology's position within this framework is inherently ambiguous: its experimental and psychophysiological branches share many features with hard sciences, while its broader clinical and social dimensions align more closely with soft-applied traditions — making it a particularly interesting case that potentially bridges the stylistic conventions of both paradigmatic positions.

A more recent strand of research has begun to document the linguistic footprint of large language models in academic writing following the public release of ChatGPT in November 2022. Analyses of preprints and full-text corpora have identified rising frequencies of LLM-favored lexical items, elevated lexical complexity, and reductions in syntactic complexity, cohesion, and readability, with LLM modification rates peaking at 17.5% in computer science abstracts by 2024 (Bao et al., 2025; Geng & Trotta, 2024; Kobak et al., 2024; Kousha & Thelwall, 2024; Liang et al., 2024). Effects vary substantially by field: scientific and biomedical literature show the most pronounced shifts, while preliminary evidence from the humanities suggests greater resilience. Alayyash (2026), examining 8,631 MA and PhD thesis titles across five humanities disciplines, reported notable pre/post-AI stability in word length, informativity, lexical diversity, and semantic content, with only a modest rise in compound structures, attributing this resilience to the brevity of titles, sustained supervisory oversight, and the strength of disciplinary genre norms. Whether psychology, positioned between hard-science methodological signaling and social-science rhetorical elaboration (Biglan, 1973), falls closer to the biomedical or to the humanities pattern remains an open empirical question, and establishing a rigorous pre-AI baseline is a precondition for any such comparison.

Despite the considerable volume of title research accumulated over the past four decades, significant lacunae remain. Psychology — despite being one of the most prolific and widely indexed scientific fields — has received relatively limited systematic attention as a target discipline for longitudinal title analysis. Existing psychology-specific studies (Whissell, 2012, 2013; Hallock & Bennett, 2020; Subotic & Mukherjee, 2014) have focused on broad multidisciplinary journals, leaving specialist experimental and psychophysiological publications largely unexamined. Most studies have also examined only one or two dimensions of title structure without integrating length, informativity, lexical diversity, syntactic form, and semantic content within a single analytical framework, and many are limited to two or three time points. The present study addresses all three gaps by analyzing 6,959 titles from over 80 specialist psychology journals across five consecutive decades (1975–2024), applying a comprehensive and systematically coded framework to trace long-term developmental trajectories and contribute a longitudinal empirical foundation for understanding how one of the world's most active scientific disciplines communicates its research through the article title.

3. METHODOLOGY

3.1 Data Collection and Sample Selection

This study investigates diachronic changes in the linguistic and structural features of research article titles within the field of psychology. The analysis spans five decades (1975–2024) and focuses on key dimensions such as title length, syntactic structure,

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semantic content (information types), informativity, and lexical diversity to trace long-term developmental patterns in how psychological research is presented in scholarly titles.

Titles were drawn from a broad selection of prominent peer-reviewed journals specializing in psychophysiology, experimental psychology, neurophysiology, and related areas. Journals were chosen for their established reputation and significant contribution to the psychological literature, particularly those publishing work on physiological correlates of behavior, sensory processes, learning, and related topics. Crucially, the selection criterion was disciplinary representativeness across the five-decade span rather than individual journal continuity: journals were included on the basis of their classification under the Psychology label in the Web of Science Core Collection and their contribution to the relevant subfields, regardless of founding date. This approach ensures that the corpus reflects the evolving landscape of specialist psychology publishing as a whole rather than the idiosyncratic editorial trajectories of any single journal, and any variation attributable to the entry of journals founded after 1975 is thus treated as part of the field's organic development rather than a confounding artifact.

The final dataset was anchored by over 80 journals, including top journals such as Psychophysiology, Quarterly Journal of Experimental Psychology, Journal of Neurophysiology, International Journal Of Psychophysiology, Quarterly Journal Of Experimental Psychology Section B-Comparative and Physiological Psychology, among many others. Journals were drawn from the Web of Science Core Collection under the “Psychology” category and were included on the basis of their classification under the Psychology label and their contribution to the relevant subfields of psychophysiology, experimental psychology, and neurophysiology (e.g., physiological correlates of behavior, sensory processes, learning, and related topics). This approach ensured disciplinary representativeness across the five-decade span rather than restricting the sample to any arbitrary impact-factor threshold. All selected journals are published in English and indexed in the Web of Science Core Collection. These titles were strategically selected to represent a broad cross-section of core and applied psychological sciences, ensuring the sample reflects organic disciplinary shifts rather than niche editorial preferences. A total of 6959 titles of original research articles were included in the final dataset. The distribution of titles across the five decades is presented in Table 1.

Table 1: Distribution of Collected Titles by Decade

Decade	Number of Titles
1975–1984	331
1985–1994	486
1995–2004	1,354
2005–2014	1,290
2015–2024	3,498
Total	6959

Titles were retrieved exclusively from original research articles (excluding editorials, reviews, commentaries, and other non-empirical formats where possible). Sampling aimed for balanced representation across available issues and years, subject to journal coverage and accessibility. The dataset thus provides a comprehensive longitudinal view of title conventions in psychology over nearly half a century. This extended time frame enables examination of gradual shifts in title construction, reflecting evolving disciplinary norms, methodological practices, and publication styles in psychological science. The longitudinal design prioritizes the identification of organic, decade-scale evolution in scholarly communication. By aggregating data by decade, the analysis minimizes the impact of short-term fluctuations and captures long-term shifts in disciplinary norms prior to the widespread integration of generative AI in academic writing. All coding and analyses were performed with consistent, transparent rules to ensure reliability and replicability. Detailed descriptions of the specific coding procedures for each variable (title length, syntactic structure, information types, informativity, and lexical diversity) are provided in the following subsections.

3.2. Coding Process

To examine the formal and content-related features of the 6959 research article titles in psychology, a set of established coding procedures was applied. These procedures were designed to capture key structural and semantic characteristics of the titles in a systematic and comparable manner across the decades (1975–2024).

To ensure procedural consistency, the second author manually coded the entire corpus. Reliability was rigorously assessed by having the first author and an external rater independently double-code a random 20% subset of the titles. Inter-coder reliability was exceptionally high, with an initial agreement rate exceeding 96% across all dimensions. Discrepancies were resolved through collaborative adjudication between the first and second authors to ensure 100% consensus for the final dataset.

Each title was coded for several dimensions: overall length (total number of orthographic words), syntactic structure, information types (semantic content), informativity, and lexical diversity. Standardized decision rules were followed throughout the process.

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Hyphenated compounds were counted as separate words, while abbreviations and acronyms were treated as single units. Particular attention was given to maintaining consistent and transparent coding criteria for all variables.

3.2.1 Title Length

Each title's length was operationalized as a simple word count, with words defined as space-separated orthographic units, following standard bibliometric practice (Xiang & Li, 2020; Morales et al., 2020; Alayyash, 2026). Hyphenated compounds were split for word-count purposes, while acronyms and abbreviations were retained as single tokens. Mean title lengths were computed for individual years across the period 1975–2024. In addition, aggregated means were obtained for broader time intervals to allow examination of long-term changes in title length.

3.2.2 Informativity

The informativity score for each title was derived from Buxton and Meadows's (1977) substantive-word measure, subsequently refined in title research (e.g., Xiang & Li, 2020; Alayyash, 2026), which expresses the density of meaning-bearing vocabulary as a proportion of total words. Open-class items (nouns, principal verbs, adjectives, and adverbs) were counted as substantive; closed-class items (determiners, articles, prepositions, conjunctions, pronouns, and auxiliary verbs) were treated as non-substantive and excluded. Scores were calculated per title as $\text{Informativity (\%)} = 100 \times (\text{substantive words} \div \text{total words})$, and subsequently averaged across decades. These scores were subsequently averaged across time periods to detect shifts in the informational density of psychological research titles.

3.2.3 Lexical Diversity

Vocabulary richness within each title was indexed by the Type-Token Ratio (TTR; Xiang & Li, 2020; Alayyash, 2026), computed as the count of distinct lexical items (types) divided by the title's total word count (tokens). While Type-Token Ratio (TTR) can be sensitive to text length, it remains a robust metric for the restricted length of research titles. Because the average title length remains within a narrow range compared to full-length articles, TTR effectively captures changes in lexical richness without significant bias from sample-size effects (Bérubé et al., 2018). Domain-specific psychological terminology was fully retained in the calculation to accurately represent the vocabulary variation present in the field.

3.2.4 Syntactic Structure

Syntactic classification of titles followed a hierarchical protocol adapted from Cheng et al. (2012) and Xiang and Li (2020), the same protocol recently applied to humanities thesis titles by Alayyash (2026). Each title was assigned to exactly one primary category according to the following priority rules:

1. Compound titles (highest priority): Any title divided into two distinct segments by a colon, dash, question mark, semicolon, or period was coded as Compound, regardless of the content of each segment (e.g., “Cardiovascular and Neurophysiological Correlates of Sensory Intake and Rejection: Effects of Cognitive Tasks” or “Averaged Evoked-Potential Predictors of Clinical Improvement in Hyperactive Children: An Initial Study and Replication”).
2. Non-compound titles: For titles without such division, classification was based on the initial functional element:
 - Titles beginning with a preposition (e.g., “On the Role of...” or “In the Effects of...”) were coded as Prepositional.
 - Titles beginning with a gerund (e.g., “Investigating Heart-Rate Biofeedback...” or “Examining Event-Related Potentials in Schizophrenic Patients...”) were coded as V-ing Phrase.
3. Full-sentence titles: Titles that formed a complete independent clause with a finite verb (declarative or interrogative) and did not qualify as compound were coded as Full Sentence.

All remaining titles—primarily complex noun phrases lacking a finite verb—were classified as Nominal. This hierarchical coding protocol ensured that each title was assigned to a single, mutually exclusive category, allowing for a precise distributional analysis of syntactic complexity and evolution over the 50-year period. Semantic information contained in the second part of compound titles was coded separately in the information-types analysis (see Section 3.2.5).

3.2.5 Information Types (Semantic/Content Features)

Research article titles were classified according to the type of information they contained, following an adapted version of the framework proposed by Goodman et al. (2001) and used in Sahragard and Meihami (2016); a parallel adaptation was recently applied to humanities thesis titles by Alayyash (2026). Five categories were used: Topic, Method, Dataset, Result, and Conclusion. A title was coded as Topic only if it indicated merely the general subject or phenomenon without providing information on method, dataset, result, or conclusion. When titles combined different types of information, all applicable categories were coded (non-mutually exclusive). Thus, Method, Dataset, Result, and Conclusion could co-occur within the same title.

- Method: The title specifies an approach to study design, data collection, analysis, or procedure (e.g., meta-analysis, evaluation, model, biofeedback training, evoked-potential recording, or statistical tests such as ANOVA).
- Dataset: The title indicates the specific population, species, subject group, or data source investigated (e.g., hyperactive children, rats, rabbits, infant speech perception, or schizophrenic patients).
- Result: The title includes explicit reference to findings or outcomes through relational terms such as effect, influence, role, relationship, impact, change, or correlation.

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- Conclusion: The title contains an unequivocal statement of implications, overall commentary, or broader significance based on the study's evidence.

This multi-label coding approach accounts for the fact that many titles in psychological research combine different types of information rather than presenting a single category.

3.2.6 Statistical Analysis

Descriptive statistics, including means, standard deviations, frequencies, and percentages, were computed for all variables using Microsoft Excel. Inferential analyses were conducted in SPSS (Version 29.0). Given the five-decade structure of the dataset, temporal trends were examined primarily at the decade level (1975–1984, 1985–1994, 1995–2004, 2005–2014, and 2015–2024). For continuous variables (title length, informativity, and lexical diversity), one-way ANOVA was used to test for overall differences across the five decades. Levene's test was applied first to assess homogeneity of variances; where this assumption was violated, Welch's ANOVA was employed as the primary inferential test, with Games–Howell post-hoc comparisons applied accordingly.

Where the homogeneity assumption was satisfied, standard Tukey HSD post-hoc tests were used. Effect size was quantified using partial eta-squared (η^2) for all ANOVA models, following conventional benchmarks of $\eta^2 \approx .01$ as small, $.06$ as medium, and $.14$ as large (Cohen, 1988). Given the large overall sample size ($N = 6,959$), which increases the sensitivity of significance tests to even trivial differences, effect size estimates were treated as the primary index of practical meaningfulness alongside p-values. Trends over time were further explored through visual inspection of line graphs showing means across decades.

Statistical treatment varied by variable type: a chi-square test of independence evaluated shifts in mutually exclusive syntactic structures. For non-mutually exclusive information types (e.g., Method, Result), separate chi-square tests were conducted for each category to identify significant changes in the frequency of specific semantic elements across decades. Standardized residuals were examined to identify specific categories driving significant differences. Effect size for all chi-square analyses was quantified using Cramér's V, with values of $.10$, $.30$, and $.50$ representing small, medium, and large effects respectively (Cohen, 1988). As with the continuous variables, V values are reported alongside chi-square statistics to provide a practical significance index independent of sample size. When expected cell frequencies were low, categories with very small counts were combined where conceptually justified.

All statistical tests were two-tailed with a significance level of $\alpha = .05$. No within-decade analyses were conducted due to the relatively small sample sizes in the earlier decades; the decade-level aggregation provided sufficient power while preserving the diachronic focus. Sensitivity checks were performed by repeating key analyses with and without the 2015–2024 decade to assess robustness of observed trends.

Visualizations consisted of line graphs for continuous variables (to illustrate temporal trends) and stacked bar charts for categorical variables (to display shifts in proportions across decades).

3.3. Ethical Considerations

This study involves the diachronic analysis of publicly available metadata (research article titles) retrieved from the Web of Science Core Collection. As the research did not involve human participants, animal subjects, or any sensitive personal data, it was deemed exempt from formal review by the Ethics Committee for Scientific Research at King Khalid University. According to institutional and national regulations (NCBE), formal ethical approval or a waiver number is not required for the analysis of publicly available, non-identifiable scholarly records.

4. RESULTS AND DISCUSSION

This section addresses the study's two central research questions through quantitative trends in five key title dimensions across five decades (1975–2024). Subsection 4.1 examines changes in title length, 4.2 lexical diversity (TTR), 4.3 informativity, 4.4 syntactic structure, and 4.5 semantic information types.

4.1. Title Length

Mean title length increased steadily across the 50-year period (see Table 2). Titles in the earliest decade averaged 11.55 words ($SD = 4.13$), rising to 14.93 words ($SD = 4.84$) in the most recent decade. Levene's test indicated a significant violation of the homogeneity of variance assumption ($F = 9.02$, $p < .001$), reflecting the considerably larger and more variable samples in later decades. Welch's ANOVA was therefore applied as the primary inferential test, confirming a highly significant effect of decade, $F(4, 1461.10) = 71.72$, $p < .001$, with effect size $\eta^2 = 0.036$. Although this constitutes a small effect by conventional benchmarks (Cohen, 1988), it represents a meaningful and persistent directional shift in scholarly communication that has accumulated gradually over half a century rather than a transient fluctuation. Games–Howell post-hoc comparisons (appropriate for Welch's ANOVA) showed that the increase was statistically significant between nearly all decade pairs (all $p \leq .002$), with the single exception of 1995–2004 versus 2005–2014 ($p = .318$).

The overall mean title length across the entire corpus was 14.22 words ($SD = 4.71$). Although the η^2 value falls in the small range by conventional benchmarks, it is noteworthy in the diachronic context: a gradual shift accumulating over five decades need not

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produce a large effect size at any single measurement point to constitute a substantively important disciplinary trend, a point to which we return in the discussion. The pattern is clearly visible in the combined figure showing both the mean trend and the spread of the data (see Figure 1).

Table 2: Descriptive Statistics for Title Length by Decade

Decade	N	Mean	SD	Min	Max
1975–1984	331	11.55	4.13	4	30
1985–1994	486	12.77	4.27	4	28
1995–2004	1,354	13.72	4.19	4	33
2005–2014	1,290	14.06	4.70	3	32
2015–2024	3,498	14.93	4.84	3	45

This pattern of lengthening titles (e.g. 1 vs 2) mirrors earlier findings in psychology (Whissell, 2012, 2013) and across disciplines (Lewison & Hartley, 2005; Hyland & Zou, 2022). Li and Xu (2019) reported a 1.5-fold increase in the Journal of Pragmatics (1978–2018), with the sharpest growth in the 1990s—an acceleration point also evident here. Martín and León Pérez (2024) observed a similar rise in biomedical titles that later plateaued under journal character limits. The absence of any plateau in the present corpus indicates that experimental and psychophysiological journals have continued to expand title length, with the informative function outweighing concerns about concision. This growth aligns with Hallock and Bennett’s (2020) experimental finding that psychology readers prefer longer titles, reinforced by keyword-driven database retrieval pressures (Whissell, 2012).

1. Psychometric Classification Of Odors (1975)
2. Normative and Psychometric Characteristics of the Health and Behavior Inventory Among Children With Mild Orthopedic Injury Presenting to the Emergency Department: Implications for Assessing Postconcussive Symptoms Using the Child Sport Concussion Assessment Tool 5th Edition (Child SCAT5) (2021)

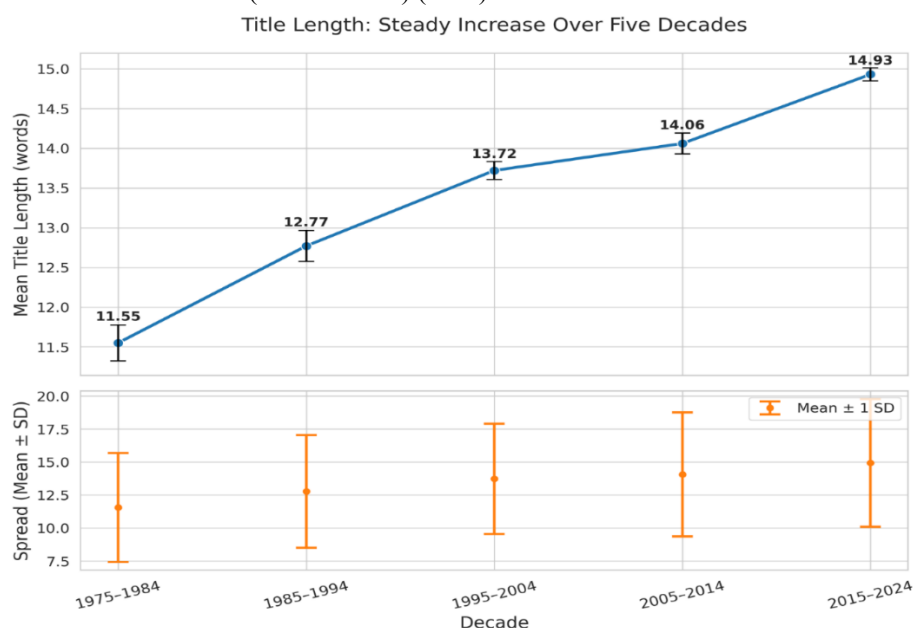


Figure 1. Title length across five decades (1975–2024). Top: mean length with standard error bars and direct labels. Bottom: spread (mean $\pm$ 1 SD). Welch's ANOVA: $F(4, 1461.10) = 71.72, p < .001$.

Taken together, these results document a clear, statistically robust lengthening of psychology titles over nearly half a century. The increase was most pronounced from the first to the last decade (+3.38 words) and remained consistent in sensitivity checks excluding the final decade. Notably, the corpus mean of 14.22 words substantially exceeds the APA’s longstanding twelve-word guideline—a guideline that Hallock and Bennett (2020) have shown authors routinely disregard. While Whissell (2012) found titles in American Psychologist remained relatively brief (averaging eight words) due to its archival role, the present findings from specialist journals confirm that experimental psychology titles have decisively moved beyond these prescriptive limits. This widening gap underscores that title-length inflation is a durable disciplinary tendency rooted in the competing demands of informativeness, keyword

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searchability, and promotional visibility. These findings provide a firm empirical baseline for future comparisons, including the potential impact of generative AI on title construction.

4.2. Lexical Diversity (TTR %)

Lexical diversity remained remarkably stable and high across the five decades (see Table 3). Mean Type-Token Ratio (TTR) ranged from 94.82% in 1975–1984 to 95.97% in 2005–2014, with an overall corpus mean of 95.77% (SD = 5.66). A one-way ANOVA revealed a statistically significant effect of decade, $F(4, 6954) = 3.84, p = .004$; however, the associated effect size was negligible ($\eta^2 = .002$), indicating that decade accounted for virtually no variance in TTR. Post-hoc Tukey HSD tests showed that the only significant differences involved the 1975–1984 decade compared with 2005–2014 ($p = .008$) (e.g. 4) and 2015–2024 ($p = .009$) (e.g. 5); all other pairwise comparisons were non-significant. Taken together, the near-uniform TTR across the full fifty-year period is best described as stable rather than trending. The temporal pattern is clearly visible in Figure 2.

3. Phonemic Dyslexia - Errors of Meaning and the Meaning of Errors (1978)
4. Memory reloaded: Memory load effects in the attentional blink (2010)
5. Why do evening people consider themselves more intelligent than morning individuals? The role of big five, narcissism, and objective cognitive ability (2019)

Table 3: Descriptive Statistics for Lexical Diversity (TTR %) by Decade

Decade	N	Mean TTR (%)	SD	Min	Max
1975–1984	331	94.82	6.94	70.00	100
1985–1994	486	95.68	5.66	72.22	100
1995–2004	1,354	95.52	5.66	61.54	100
2005–2014	1,290	95.97	5.71	62.50	100
2015–2024	3,498	95.89	5.49	64.71	100

This high and stable lexical diversity contrasts with the slight decline reported in some linguistic fields (Xiang & Li, 2020). In psychology titles, the consistently elevated TTR (near 96% across four decades) indicates that authors continued to draw on a rich and varied technical vocabulary rather than converging on a narrow set of standardized expressions. This pattern gains additional interpretive weight from Whissell’s (2012) observation of declining word frequency (i.e., increasing use of rarer, discipline-specific terms) in *American Psychologist* and from Whissell, Abramson, and Barber (2013), who documented a cognitive reorientation in comparative psychology journals from the 1980s onward. The modest TTR increase from the earliest decade thus appears to reflect ongoing terminological specialization rather than stylistic convergence—a pattern that distinguishes psychology from softer social science fields (Xiang & Li, 2020).

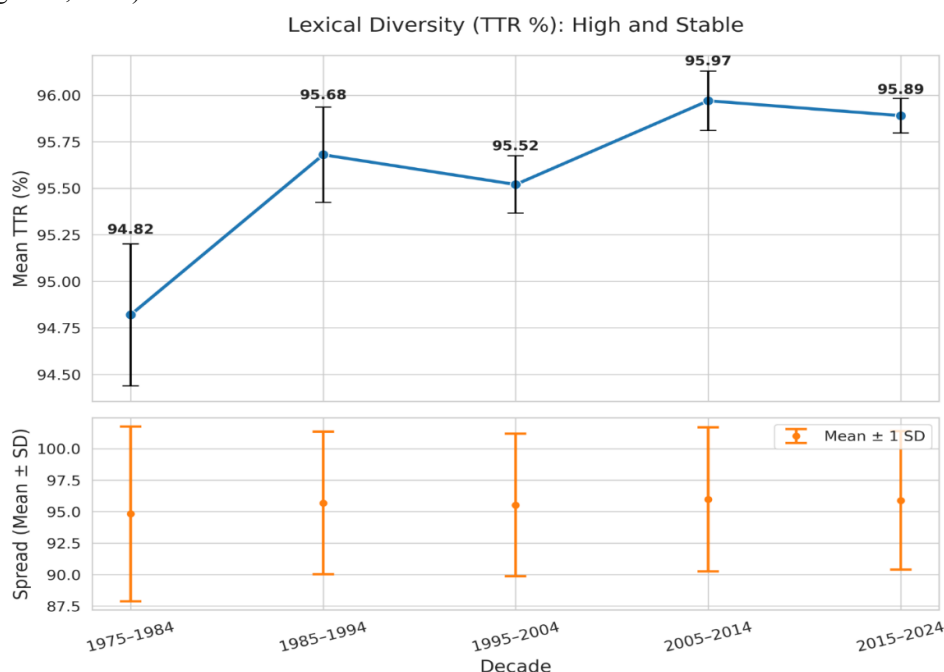


Figure 2. Lexical diversity (Type-Token Ratio, %) across five decades. Top: mean TTR with standard error bars and direct labels. Bottom: spread (mean $\pm$ 1 SD). ANOVA: $F(4, 6954) = 3.84, p = .004$.

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Overall, these findings indicate that lexical diversity in psychology research article titles has been both high and stable over nearly five decades. This stability provides an important baseline against which future shifts—particularly those potentially introduced by generative AI tools—can be evaluated.

4.3. Informativity (%)

Informativity remained relatively stable but showed a modest yet statistically significant increase across the five decades (see Table 4). Mean informativity rose from 70.56% (SD = 9.22) in 1975–1984 to 72.11% (SD = 8.43) in 2015–2024, with an overall corpus mean of 71.88% (SD = 8.53). A one-way ANOVA confirmed a significant effect of decade, $F(4, 6954) = 4.47$, $p = .001$, $\eta^2 = .003$. The effect size is small, consistent with the modest increase observed. Post-hoc Tukey HSD tests indicated that the earliest decade (1975–1984) had significantly lower informativity (e.g. 6) than both 1995–2004 ($p = .038$) (e.g. 7) and 2015–2024 ($p = .014$) (e.g. 8), while 1985–1994 (e.g. 9) was also lower than 2015–2024 ($p = .021$). No other pairwise differences reached significance. The temporal trend is illustrated in Figure 3.

6. Transfer of Persistence to the Acquisition of a New Behavior (1979)

7. Stimulus representations in human Pavlovian conditioning: Implications of missing negative transfer across response systems (2000)

8. Understanding face matching (2023)

9. Response-Inhibition Initiates Cardiac Deceleration - Evidence From A Sensory-Motor Compatibility Paradigm (1991)

Table 4: Descriptive Statistics for Informativity (%) by Decade

Decade	N	Mean Informativity (%)	SD	Min	Max
1975–1984	331	70.56	9.22	45.45	100
1985–1994	486	70.86	8.42	46.67	100
1995–2004	1,354	72.04	8.21	41.67	100
2005–2014	1,290	71.83	8.90	30.77	100
2015–2024	3,498	72.11	8.43	35.29	100

This pattern of modestly rising informational density aligns with broader trends in title research, where titles have become more informative over time due to database indexing pressures and the need for greater specificity (Buxton & Meadows, 1977; Xiang & Li, 2020; Hyland & Zou, 2022). Li and Xu (2019) reported a comparable increase in lexical density in the *Journal of Pragmatics* — from approximately 63.5% in 1978 to 66.6% in 2018 — mainly due to post-1990s compound constructions. Martín and León Pérez (2024) documented rising informational density in biomedical titles as authors shifted toward verbally active constructions foregrounding results and conclusions. In psychology, the increase (from ~70.5% to 72.1%) is comparatively modest, reflecting the field’s already high baseline informativity, consistent with its strong hard-science characteristics (Biglan, 1973). This high baseline left limited proportional room for gain, yet the sustained upward trajectory confirms that publication and digital indexing pressures have continued to push authors toward denser formulations.

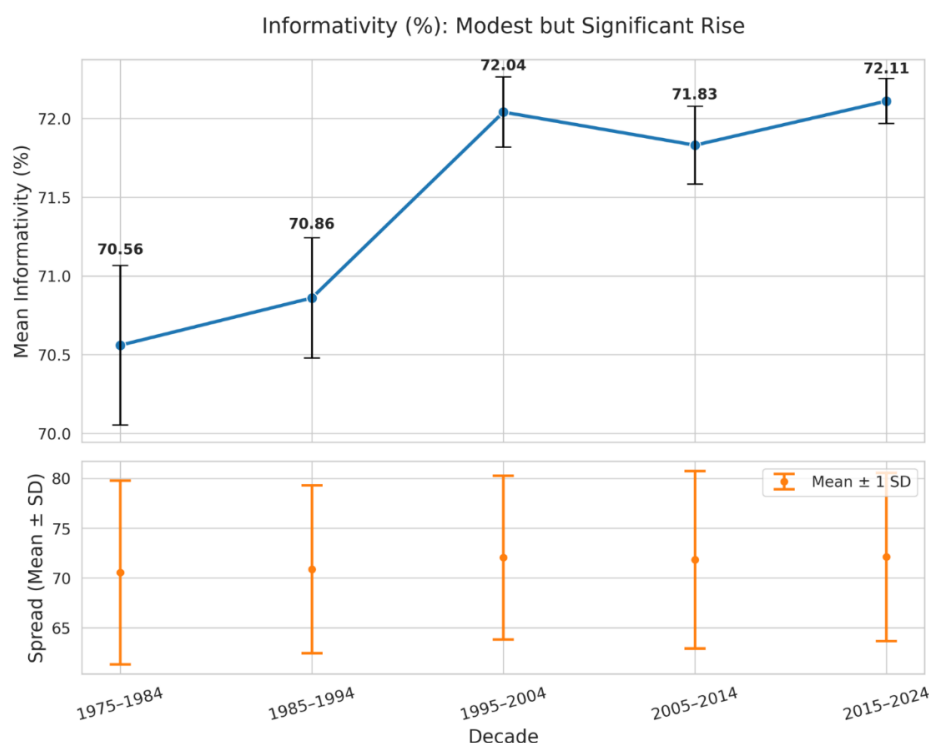


Figure 3. Informativity (%) across five decades. Top: mean informativity with standard error bars and direct labels. Bottom: spread (mean $\pm$ 1 SD). ANOVA: $F(4, 6954) = 4.47, p = .001$.

Taken together, these results document a small yet reliable increase in the informational density of psychology titles over nearly half a century. The change is most evident when comparing the earliest decade to the two most recent ones. The consistently high baseline ($>70\%$) distinguishes this corpus from softer social science fields with markedly lower lexical density (Li & Xu, 2019; Nagano, 2015). This sustained density, combined with the modest upward trend, confirms that publication pressures and digital indexing demands have gradually pushed psychology authors toward more content-saturated titles, providing an empirical baseline for tracking future developments in scholarly communication, including potential effects of generative AI on title construction.

4.4. Syntactic Structure

Compound titles remained the dominant syntactic form throughout the five decades, accounting for 65.71% of the entire corpus, followed by nominal constructions (25.52%). The distribution of syntactic categories shifted significantly across time, $\chi^2(16) = 104.08, p < .001$, Cramér's $V = .06$ (see Table 5). The small effect size reflects that compound titles maintained structural dominance across all periods rather than being displaced; the significant chi-square signals a consistent directional drift, particularly the rise of full-sentence titles. The proportion of compound titles fluctuated but stayed high (61.3–72.6%) (e.g. 10), while full-sentence titles (e.g. 11) increased steadily from 2.11% in 1975–1984 to 7.55% in 2015–2024. Nominal titles (e.g. 12) peaked at 32.35% in the middle period before declining, and V-ing phrase titles (e.g. 13) rose modestly from near absence to 2.80%. Prepositional titles (e.g. 14) remained extremely rare ($<0.3\%$).

10. Acute effects of aerobic exercise on mood and hunger feelings in male obese adolescents: a crossover study (2012)
11. Flicker masking depends on the method of measurement (1996)
12. Effect of oral ketorolac and gender on human cold pressor pain tolerance (2003)
13. Tracking Irregular Acoustic Patterns by Finger Tapping (1988)
14. Toward a chronopsychophysiology of mental rotation (2002)

Table 5: Percentage Distribution of Syntactic Structures by Decade

Decade	Compound (%)	Full sentence (%)	Nominal (%)	Prepositional (%)	V-ing phrase (%)
1975–1984	71.30	2.11	26.28	0.30	0.00
1985–1994	72.63	2.88	22.63	0.21	1.65
1995–2004	61.30	5.17	32.35	0.30	0.89

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2005–2014	64.50	7.36	25.74	0.00	2.40
2015–2024	66.38	7.55	23.13	0.14	2.80

Standardized residuals showed that the significant chi-square was driven primarily by the under-representation of full-sentence titles in the earliest decades and their over-representation in the most recent ones, along with the mid-period peak in nominal constructions. The dip in compound titles during 1995–2004 (61.3%), coinciding with the peak in nominal constructions, likely reflects the rapid diversification of psychology’s conceptual landscape during the cognitive revolution.

These shifts extend earlier observations in psychology (Whissell, 2012, 2013; Dillon, 1982) and across disciplines (Hartley, 2007; Hyland & Zou, 2022), where compound structures combine general framing with precise specification. Li and Xu (2019) documented a parallel transition in the *Journal of Pragmatics*, with compound constructions rising from ~34% in 1978 to nearly 69% by 2018. The persistent dominance of compound forms in this corpus (65.71% overall) situates psychology within this broader movement. Reader preference reinforces this pattern: Hallock and Bennett (2020) showed that psychology readers significantly preferred colon-divided titles. The gradual rise in full-sentence titles—from 2.11% in 1975–1984 to 7.55% in 2015–2024—contrasts with the stronger shift in biomedical titles toward verbally active constructions (Martín & León Pérez, 2024). Psychology’s more modest movement highlights its disciplinary hybridity, retaining a preference for nominal compound structures that efficiently index topics without explicit result announcement.

The evolution is visualized in the stacked bar chart (Figure 4), which highlights both the persistent dominance of compound forms and the clear increase in full-sentence and V-ing constructions over time.

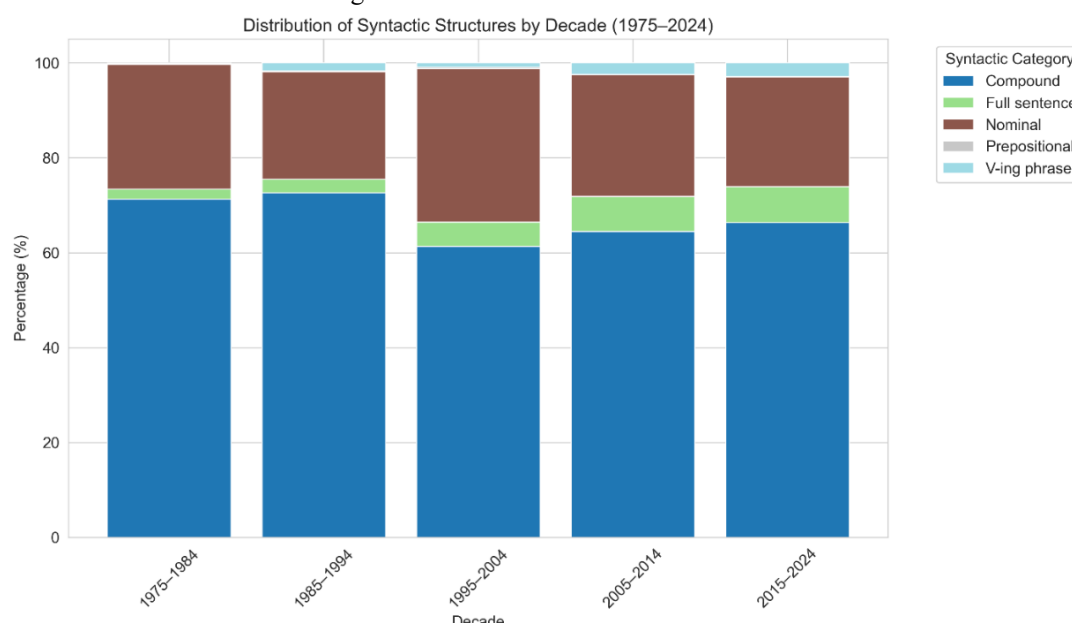


Figure 4. Distribution of Syntactic Structures by Decade (1975–2024)

Overall, the analysis reveals a stable yet evolving syntactic landscape in psychology titles, with compound forms remaining the preferred vehicle for balancing informativeness and concision while full-sentence titles gain modest ground. These patterns provide a robust baseline for future comparisons and underscore the sensitivity of title syntax to broader changes in disciplinary communication practices.

4.5. Information Types (Semantic/Content Features)

The five semantic information types showed distinct temporal patterns across the 50-year period (see Table 6). Result-oriented information (e.g., 15) was the most prevalent category overall (ranging between 32% and 45%), although it was briefly surpassed by Topic-related titles (e.g., 16) during the 1995–2004 decade. While the inclusion of Method (e.g., 17) and Dataset (e.g., 18) information declined after the earliest decades, Conclusion-signaling content (e.g., 19) rose steadily, increasing from less than 2% to 3.8% in the most recent period.

15. The influence of goal-state access cost on planning during problem solving (2011)

16. Behavioral-Contrast And Autosaping (1976)

17. Validity and reliability of smartphone orientation measurement to quantify dynamic balance function (2018)

18. Dynamics of Abducens Nucleus Neurons in the Awake Rabbit (1995)

19. Local critical power is an index of local endurance (2000)

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Separate chi-square tests of independence confirmed statistically significant shifts for every category. Effect sizes (Cramér's V) are reported alongside each test to index practical significance independently of the large sample size: Topic, $\chi^2(4) = 31.67$, $p < .001$, $V = .07$; Method, $\chi^2(4) = 39.78$, $p < .001$, $V = .08$; Dataset, $\chi^2(4) = 21.62$, $p = .0002$, $V = .06$; Result, $\chi^2(4) = 65.07$, $p < .001$, $V = .10$; Conclusion, $\chi^2(4) = 24.51$, $p = .0001$, $V = .06$. All V values fall in the small range, indicating that no single semantic category underwent a dramatic distributional reversal. The largest effect, though still small, was observed for Result ($V = .10$), consistent with the marked fluctuation of this category — from a low of 32.79% in 1995–2004 to a high of 45.50% in 2005–2014 — across the period.

Standardized residuals indicated that the mid-period (1995–2004) drove the peak in Topic and the dip in Method/Result, whereas later decades showed elevated Result and Conclusion content.

Table 6: Percentage of Titles Containing Each Semantic Information Type by Decade

Decade	Topic (%)	Method (%)	Dataset (%)	Result (%)	Conclusion (%)
1975–1984	33.23	24.47	22.66	43.50	0.91
1985–1994	31.07	18.31	34.16	42.59	1.65
1995–2004	39.22	12.19	32.72	32.79	1.70
2005–2014	31.01	15.04	28.99	45.50	3.57
2015–2024	31.25	17.58	28.36	44.85	3.80

These findings enter into productive dialogue with parallel diachronic studies. Sahragard and Meihami (2016) found Method information dominant in applied linguistics journals — a pattern that diverges from the present corpus, where Result information remained consistently higher. This likely reflects the experimental nature of the sampled journals. Li and Xu (2019) observed rising Method and declining Topic-only titles in the *Journal of Pragmatics*, mirroring the mid-period dip in Topic here. The most instructive contrast concerns Conclusion-signaling content. While it declined or remained marginal in applied linguistics and pragmatics (Sahragard & Meihami, 2016; Li & Xu, 2019), Martín and León Pérez (2024) reported a dramatic rise in biomedical titles. The modest but consistent growth in the present corpus (from 0.91% to 3.80%) suggests psychology is beginning to follow the biomedical promotional trajectory, though at a slower rate consistent with its intermediate hard/soft science position (Biglan, 1973). The mid-period peak in Topic-only titles coincides with disciplinary diversification during the cognitive revolution (Whissell, Abramson, & Barber, 2013). The overall distribution and changes are visualized in the stacked bar chart (Figure 5).

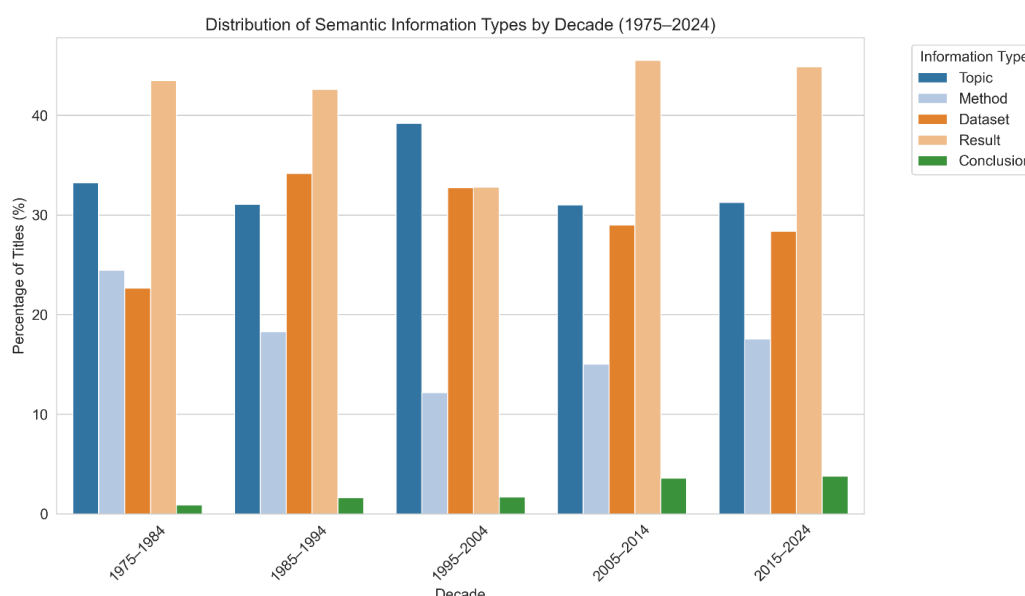


Figure 5. Distribution of Semantic Information Types by Decade (1975–2024)

In summary, psychology titles have become modestly more explicit about results and conclusions over time while retaining a strong focus on core disciplinary content. These patterns provide a detailed empirical baseline for the field and underscore the title's role as a sensitive indicator of evolving rhetorical and epistemological priorities in scholarly communication.

5. CONCLUDING REMARKS

This study traced the long-term evolution of research article titles in psychophysiology and experimental psychology across five consecutive decades (1975–2024), examining 6,959 titles from over 80 high-impact journals along five complementary analytical dimensions. Addressing the first research question — concerning changes in title length, informativity, and lexical diversity — the findings reveal a coherent pattern of gradual expansion. Mean title length increased by approximately three and a half words, from 11.55 words in 1975–1984 to 14.93 words in 2015–2024, significantly exceeding the APA's twelve-word guideline throughout — a norm authors have long and systematically disregarded (Hallock & Bennett, 2020). Informativity rose modestly but significantly from approximately 70.5% to 72.1%, reflecting a shift toward denser content-word loading consistent with digital keyword retrieval demands (Li & Xu, 2019). Lexical diversity, measured via TTR, remained remarkably high and stable across all five decades (≈95–96%) — contrasting with declining diversity reported in some linguistic fields — a pattern that appears to reflect the progressive incorporation of specialized psychophysiological and cognitive terminology documented in comparable psychology journals by Whissell, Abramson, and Barber (2013) and Whissell (2012).

Addressing the second research question — concerning shifts in syntactic structure and semantic information types — the findings reveal both continuity and directional change. Compound titles remained the dominant syntactic form throughout the period (65.71% of the total corpus), consistent with parallel findings in the *Journal of Pragmatics* (Li & Xu, 2019) and with experimental evidence that psychology readers actively prefer colon-divided titles (Hallock & Bennett, 2020). Full-sentence constructions grew more than threefold — from 2.11% to 7.55% — signaling a restrained movement toward the result-announcing verbal titles that have become dominant in biomedical fields (Martín & León Pérez, 2024). In terms of semantic content, Result information maintained the highest frequency across all decades, confirming the experimental orientation of the sampled journals, while Conclusion-signaling content rose steadily from under 1% to 3.8%. This latter trajectory, though smaller in magnitude than the dramatic conclusion-foregrounding observed in experimental medicine (Martín & León Pérez, 2024), is directionally consistent with a field-wide promotional turn and distinguishes psychology from applied linguistics, where Conclusion information has followed a declining trend (Sahragard & Meihami, 2016).

Taken together, these patterns speak to the complex interplay of forces shaping scholarly communication in a disciplinarily hybrid field. The steady increases in title length, informativity, and result-orientation reflect psychology's response to three intersecting pressures: expansion into increasingly specialized subfields requiring greater titling precision, the transition to digital-database retrieval systems incentivizing keyword-rich and result-transparent formulations, and the growing promotional function of academic titles in a competitive publication landscape (Whissell, 2012; Martín & León Pérez, 2024). That these changes have been gradual, and that compound nominal forms have remained structurally dominant throughout, suggests that psychology occupies a distinctive middle ground — moving toward the promotional and informationally explicit conventions of the biomedical sciences while retaining the nominal structural preferences characteristic of social science traditions (Biglan, 1973). The title, in this sense, functions not merely as a label but as an index of the field's evolving epistemological and communicative identity.

This study makes several empirical contributions. By examining 6,959 titles from over 80 specialist psychology journals, it offers the most comprehensive longitudinal analysis of psychophysiological and experimental psychology title conventions to date, extending and refining the foundational findings of Whissell (2012, 2013) beyond broad multidisciplinary venues and into specialist experimental territory. The integrated analytical framework — combining length, lexical diversity, informativity, syntactic structure, and semantic information types within a single diachronic design — provides a more complete portrait of titling evolution than prior single-dimension studies, and the consistency of findings across multiple indicators strengthens interpretive reliability. By establishing clear decade-level baselines across all five dimensions, the study provides a methodologically replicable reference point for future investigations, including those examining the potential impact of generative AI on scholarly title construction. In a closely comparable five-dimensional analysis of humanities thesis titles before and after the public release of ChatGPT, Alayyash (2026) reported substantial pre/post-AI stability across word length, informativity, lexical diversity, and semantic content, with only a modest rise in compound structures. This pattern suggests that the brevity and human-supervised nature of titles may limit deep LLM intervention in that subgenre, and whether psychology's high-volume specialist publishing exhibits a comparable resilience or instead shows more pronounced AI-mediated change remains an open question for future work. These findings also carry clear practical implications: as generative AI tools become increasingly integrated into manuscript preparation, editors may wish to establish explicit guidelines for AI-assisted title generation to preserve disciplinary conventions and rhetorical authenticity, while authors can use the empirical baselines established here to evaluate whether AI-generated titles align with the long-term evolutionary patterns of the field — particularly the preference for informative compound structures and result-oriented content.

Several limitations warrant acknowledgment. First, the corpus is restricted to high-impact English-language journals indexed in the Web of Science, which may limit generalizability to regional, non-Anglophone, or lower-impact psychology outlets. Second, decade-level aggregation cannot resolve within-decade fluctuations or the influence of specific editorial transitions on individual journals. Third, lexical diversity was operationalized using TTR, which is theoretically sensitive to text length; although this sensitivity is generally negligible given the narrow length range of research titles (Bérubé et al., 2018), future work may wish to

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apply length-normalized alternatives such as the Moving-Average Type-Token Ratio as a confirmatory measure. Fourth, the study's temporal boundary in 2024 captures only the earliest traces of generative AI's potential influence on academic writing — a boundary requiring revisitation as AI-assisted manuscript preparation becomes more widespread.

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