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Declining use of neurological eponyms in cases where a non-eponymous alternative exists

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ABSTRACT

Eponyms are common in neurology, but their use is controversial. Recent studies have demonstrated increasing eponym use over time in the scientific literature, but it is unclear whether this is a result of authors choosing to use eponyms more frequently, or is merely a product of increasing rates of scientific publication. Our goal was to explore trends in decision-making pertaining to eponym usage. We identified cases where an eponym and a corresponding non-eponymous term existed, and assessed temporal trends in the relative usage of these terms using Google's n-gram viewer for each decade from 1900–2019. Relative to corresponding non-eponymous terms, the use of eponyms increased across the 20th century, peaking in the decade from 1980 to 1989, before sharply declining after the turn of the 21st century. This indicates that when faced with a choice between using an eponym and non-eponymous term, contemporary authors increasingly chose the non-eponymous term. This recent trend may reflect increased awareness of the limitations of eponyms, greater attention to the personal and political lives of namesakes, and a cultural shift toward viewing scientific advances as the result of collective and collaborative efforts rather than the solitary achievements of eminent individuals.

1. Introduction

An eponym is a person for whom something is or is believed to be named. Eponymous terms are commonly used across medicine, particularly within neurology. Eponyms flourished in the late nineteenth and early twentieth centuries, and reflect the European cultural and scientific dominance of the time, with a majority being German, English, or French [1]. They are typically ascribed later, not by the namesake, but as a means of paying tribute to an important scientific or clinical contribution. For example, James Parkinson in 1817 wrote *An Essay on the Shaking Palsy*, and described a condition he called "paralysis agitans" [2]. It was not until 1877 that Jean-Martin Charcot proposed naming the condition Parkinson's disease as a tribute to Parkinson [3].

The use of eponyms in medicine has long been controversial. Proponents point out that eponyms add interest to otherwise mundane or wordy labels, help preserve the history of medicine, and serve as a form of tribute to influential scientists and clinicians of the past [4,5]. Opponents state that eponyms are non-descriptive, confusing when multiple phenomena are attached to a single name, cumbersome when multiple names are attached to a single phenomenon, and generally do not reflect the collaborative nature of science or clinical medicine [4,5].

Recent studies have demonstrated increasing eponym use over time in the neurologic and biomedical literature [6,7]. However, it is unclear whether this is a result of authors choosing to use eponyms more frequently, or is merely a product of the increasing volume of scientific publications. Our goal was to explore trends in decision-making pertaining to eponym usage. We focused on cases where an eponym and a corresponding non-eponymous term existed, and assessed temporal trends in the usage of eponyms relative to non-eponymous alternatives. In other words, when authors were faced with a choice between using an eponym or a non-eponymous term, which one did they choose?

2. Methods

Two clinical neurology textbooks were used to generate a list of candidate eponyms [8,9]. Eponyms for diseases, syndromes, signs, and reflexes were included if they were listed in the index of both texts. As our focus was eponym use in clinical neurology, purely anatomical eponyms were excluded. A list of all candidate eponyms is provided in Appendix I.

From this candidate list, we selected all eponyms for which at least one corresponding non-eponymous term existed. Non-eponymous terms

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were included if they were listed in the index along with the eponym, or were listed on the referenced pages in the text itself. Where multiple variations of the eponym or non-eponymous term existed, all were included (see Table 1).

Our primary data source was Google's n-gram viewer. This tool displays the frequency of occurrence of an n-gram, or particular string of characters, for example "Charcot," within the corpus of books and scientific manuscripts indexed by Google [10]. The output reflects the frequency of a given word's usage as a proportion of all the words within the corpus in a given year. We used Google's "English 2019″ corpus, which includes English language texts that were published in any country from 1500 to 2019. Our analysis was restricted to the years 1900−2019.

Table 1 lists all search terms that were included. For each eponym, we included both possessive and non-possessive forms (e.g., "Broca's aphasia" and "Broca aphasia"). For the non-eponymous terms we included multiple descriptors (e.g., "expressive aphasia" and "motor aphasia") where they existed.

For each year, the n-gram values of all eponyms were summed to determine the overall frequency of eponym usage for that year. The mean n-gram value was then obtained for each decade to better illustrate broad historical trends and to smooth out year over year fluctuations. The same process was repeated for non-eponymous terms. Then a ratio of eponym to non-eponymous term usage was calculated as the quotient of mean eponym value divided by the mean non-eponymous term value for each decade.

3. Results

An initial list of 146 candidate eponyms was obtained (see Appendix I), of which 68 (47 %) had corresponding non-eponymous terms (see Table 1). Fig. 1A shows the n-gram values for these eponyms and non-eponymous terms over the years 1900−2019. Both follow similar trends, steadily increasing over time. Fig. 1B shows temporal trends in the ratio of eponym to non-eponymous term usage (i.e., ratio >1 means eponyms were used more frequently). The overall trend is toward increasing relative usage of eponyms over the course of the 20th century (i.e., increasing ratios), with peak relative eponym use occurring in the period from 1980 to 1989, with a slight decrease in the period from 1990−1999. Since the turn of the 21st century, there has been a sharp decrease in the relative use of eponyms. The period from 2010 to 2019 demonstrated the lowest relative eponym usage since 1940−1949.

4. Discussion

The absolute use of neurologic eponyms has continued to increase consistent with other studies tracking eponym usage in the neurologic literature [7], and in biomedical literature more broadly [6]. However, this finding must be interpreted with caution, since the total number of published scientific manuscripts has also increased. This is the first study to look at eponym use relative to the use of synonymous non-eponymous terms. When presented with a choice between the two, 21st century authors have increasingly chosen the non-eponymous term.

There are several possible explanations for increasing preference toward non-eponymous terms over recent years. It may reflect an increased awareness of the limitations of eponym use and substitution of more descriptive terms. There has been an increased use of genetic and molecular diagnostics in the naming and classification of disease, which provides an alternative to eponymous disease names in some cases. For example, a deficiency of the enzyme alpha-galactosidase A was identified in the 1960s as the cause of the disease initially described by Fabry in 1898 [11]. In such cases, eponyms may prove useful before a mechanistic or pathophysiologic understanding exists, after which they can be replaced. In cases where a descriptive term exists at the outset, an eponym may never gain popularity. For example, the "Barre test" and "Zaufal's sign" were never in widespread use, perhaps because

Table 1
List of all 68 sets of eponyms and corresponding non-eponymous terms included in the study. Each item in the table represents a search term for which n-gram values were obtained (note: search terms for both possessive and non-possessive forms of each eponym were included, though both forms are not listed in the table).

Eponym	Corresponding non-eponymous term
Adie's pupil	tonic pupil
Andersen's disease	glycogen storage disease type IV, glycogen storage disease IV, GSD IV
Argyll Robertson pupils	light near dissociation
Babinski sign	extensor plantar response, plantar reflex, plantar response
Bassen-Kornzweig syndrome	abetalipoproteinemia
Batten disease	neuronal ceroid lipofuscinoses
Battle sign	Mastoid ecchymosis, mastoid ecchymoses
Bell's palsy	idiopathic facial paralysis, idiopathic facial palsy, idiopathic facial mononeuropathy
Binswanger's disease	subcortical arteriosclerotic encephalopathy, subcortical leukoaraiosis, subcortical white matter disease, chronic small vessel ischemic disease
Bradbury-Eggleston syndrome	pure autonomic failure
Broca's aphasia	expressive aphasia, motor aphasia
Brown-Séquard syndrome	hemisection syndrome
Chagas disease	American trypanosomiasis
Charcot-Marie-Tooth disease	hereditary motor and sensory neuropathy
Churg-Strauss syndrome	eosinophilic granulomatosis with polyangiitis
Cogan's syndrome	congenital oculomotor apraxia
Cori-Forbes disease, Cori's disease	debranching enzyme deficiency, glycogen storage disease type III, GSD III
Creutzfeldt-Jakob disease	subacute spongiform encephalopathy
Crouzon syndrome	craniofacial dysostosis
Cushing syndrome	hyperadrenalism, hypercortisolism
De Morsier syndrome	septo-optic dysplasia, septooptic dysplasia
Déjerine-Sottas disease	hypertrophic neuropathy of infancy
Devic disease	neuromyelitis optica, NMO
Fabry disease	alpha-galactosidase-A deficiency
Fazio-Londe disease	progressive bulbar palsy of childhood
Greenfield's disease	infantile metachromatic leukodystrophy
Guillain-Barré syndrome	acute inflammatory demyelinating polyradiculoneuropathy, AIDP
Hallervorden-Spatz disease	pantothenate kinase-associated neurodegeneration
Hashimoto encephalopathy	steroid-responsive encephalopathy associated with autoimmune thyroiditis, SREAT
Horner's syndrome	oculosympathetic palsy
Hunter disease	mucopolysaccharidosis type II
Hurler disease	mucopolysaccharidosis type I
Isaac's syndrome	neuromyotonia, syndrome of continuous muscle fiber activity
Kennedy syndrome	spinal bulbar muscular atrophy, spinobulbar muscular atrophy
Klinefelter syndrome	XXY syndrome
Krabbe disease	globoid cell leukodystrophy, galactosylceramide lipidosis
Kufs disease	adult neuronal ceroid lipofuscinosis
Leigh syndrome	subacute necrotizing encephalomyelopathy
Lisch nodule	iris hamartoma
Lou Gehrig's disease	amyotrophic lateral sclerosis
Machado-Joseph disease	spinocerebellar ataxia type III, SCA 3
Marchiafava-Bignami disease	primary degeneration of the corpus callosum
McArdle disease	glycogen storage disease type V, GSD V
Munchausen syndrome	factitious disorder
Ondine's curse	primary hypoventilation syndrome, idiopathic hypoventilation syndrome
Paget's disease	osteitis deformans
Parinaud syndrome, Sylvian aqueduct syndrome	dorsal midbrain syndrome, pretectal syndrome
Parsonage-Turner syndrome	idiopathic brachial plexopathy, brachial plexus neuritis, brachial neuritis
Pick's disease	frontotemporal dementia
Pompe disease	glycogen storage disease type II, GSD II
Ramsay Hunt syndrome	herpes zoster oticus
Riley-Day syndrome	congenital dysautonomia, familial dysautonomia, hereditary sensory and autonomic neuropathy type III, HSAN III, HSAN 3
Roussy-Lévy syndrome	hereditary areflexic dystasia

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Table 1 (*continued*)

Eponym	Corresponding non-eponymous term
Schwartz-Jempel syndrome	myotonic chondrodystrophy
Shy-Drager syndrome	multiple system atrophy
Strümpell-Lorrain disease	hereditary spastic paraparesis
Sturge-Weber syndrome	encephalotrigeminal angiomatosis, encephalofacial angiomatosis
Takayasu disease, Takayasu arteritis	aortic branch disease, occlusive thromboaortopathy
Tarui disease	phosphofructokinase deficiency, glycogen storage disease type VII, GSD VII
Tay-Sachs disease	GM2 gangliosidosis, hexosaminidase A deficiency
Todd's paresis, Todd's paralysis	postictal paresis, postictal paralysis
Unverricht-Lundborg disease	Baltic myoclonus, progressive myoclonic epilepsy type 1, EPM1
Wallenberg syndrome	lateral medullary syndrome, posterior inferior cerebellar artery syndrome, PICA syndrome
Wegener granulomatosis	granulomatosis with polyangiitits
Werdnig-Hoffmann disease	spinal muscular atrophy type 1, SMA1
Wernicke aphasia	receptive aphasia, sensory aphasia, posterior aphasia
West syndrome	infantile spasms
Wilson's disease	hepatolenticular degeneration
Zellweger syndrome	cerebrohepatorenal disease

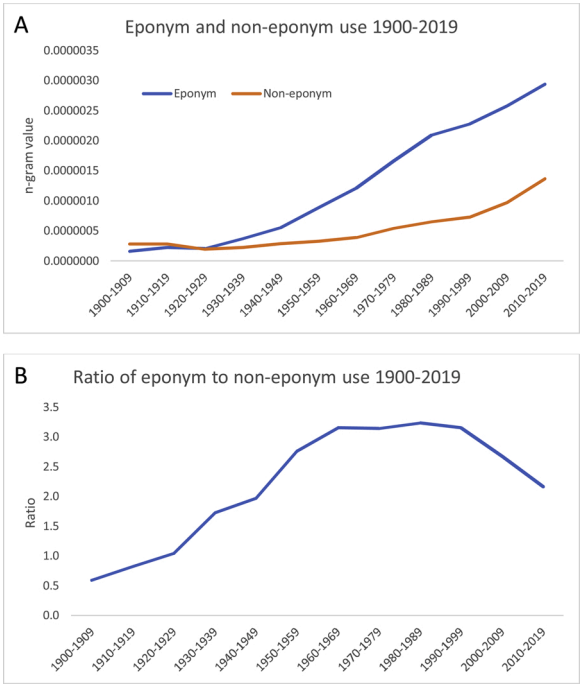

Fig. 1. Trends in absolute and relative eponym use over time. Panel A shows n-gram values for all eponyms and for all non-eponymous terms for each decade (i.e., the sum of n-gram values for all eponyms and non-eponymous terms for each year averaged over each decade). Panel B shows the ratio of eponym to non-eponymous term n-gram values for each year. A ratio of >1 indicates that the eponym is used more frequently than corresponding non-eponymous terms.

"pronator drift" and "saddle-nose defect" were available as descriptive terms.

Another potential explanation for the decreasing use of eponyms is a cultural shift toward recognizing advances in medicine as shared achievements of the scientific community. There is a temporal correlation between decreased eponym usage with a shift toward evidence-based medicine and away from "eminence-based" medicine [12]. Perhaps in the cultural context of 21st century medicine, attaching an eminent name to a disorder does not carry the influence that it did in previous centuries.

There has also been a more critical cultural appraisal of the individuals for whom eponyms are named over recent years. For example, the last two decades have seen the fall of the term Hallervorden-Spatz disease in favor of the non-eponymous term pantothenate kinase-associated neurodegeneration [13]. This coincides with the public acknowledgement that Julius Hallervorden and Hugo Spatz were complicit in the study and use of brains acquired from a Nazi euthanasia program between 1939 and 1941. Other eponyms such as Wegener's granulomatosis and Reiter's syndrome have fallen out of favor for similar reasons [14].

While some may view a historical figure who participated in or condoned grave human rights violations as a product of their time, the precipitous fall of these eponyms suggests that contemporary audiences are more likely to view the scientific accomplishments of an individual in the context of their personal and political life. Perpetuation of an eponym celebrates the namesake, an honor that we are increasingly reserving for those with an unimpeachable reputation for serving the greater good. Perhaps the lessons learned from Hallervorden, Spatz, Wegener, and Reiter have trickled down into our collective consciousness, and we hesitate to accept an eponymous term without knowing more details about the life of the namesake.

There are several limitations to the current study. First, our study was not designed to measure trends in absolute eponym use over time. Because we included only terms that are used in contemporary sources, it is not surprising that the observed use of both the eponyms and non-eponymous terms increased over time. Those that have decreased in use are more likely to have fallen out of common parlance and been excluded from contemporary textbooks, and thus not included in our study. However, this bias should not impact trends in relative use, which was our primary focus. Second, the list of eponyms included is not exhaustive. The list was derived from clinical neurology textbooks published in North America, and may overrepresent North American eponyms and underrepresent eponyms that are commonly used in other parts of the world. Third, Google's n-gram tool captures the frequency of usage in medical and scientific texts, but this does not necessarily reflect everyday use in clinics, on medical wards, by the public, or in the press. In addition, the context of eponym use is not measured using n-gram values. Some instances of eponym use may have been as part of a critical discussion, or even opposition to using the eponyms.

5. Conclusion

Compared to their non-eponymous counterparts, the use of neurological eponyms increased over the 20th century but has decreased sharply over recent years, with relative eponym usage in the period from 2010 to 2019 at the lowest rate since 1940–1949. This may reflect increased awareness of the limitations of eponym use, a greater attention to the personal and political lives of the namesakes, and a cultural shift toward viewing scientific advances as the result of collective and collaborative efforts rather than the solitary achievements of eminent individuals.

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Zachary London- reports no disclosures

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Christopher J. Becker: Conceptualization, Data curation, Investivation, Metholdology, Writing - original draft, Writing - review &

editing. **Mollie McDermott:** Conceptualization, Metholdology, Writing - review & editing. **Zachary N. London:** Conceptualization, Metholdology, Writing - review & editing.

Appendix I. List of all candidate eponyms and corresponding non-eponymous terms

Eponym	Corresponding non-eponymous term
Adie's pupil	tonic pupil
Alexander's disease	–
Alzheimer's disease	–
Andersen's disease	glycogen storage disease type IV, glycogen storage disease IV, GSD IV
Argyll Robertson pupils	light near dissociation
Asperger syndrome	–
Babinski sign	extensor plantar response, plantar reflex, plantar response
Balint syndrome	–
Bassen-Kornzweig syndrome	abetalipoproteinemia
Batten disease	neuronal ceroid lipofuscinoses
Battle sign	Mastoid ecchymosis, mastoid ecchymoses
Becker muscular dystrophy	–
Behçet's disease	–
Behr syndrome	–
Bell's palsy	idiopathic facial paralysis, idiopathic facial palsy, idiopathic facial mononeuropathy
Benedikt syndrome	–
Biot breathing	–
Binswanger's disease	subcortical arteriosclerotic encephalopathy, subcortical leukoariosis, subcortical white matter disease, chronic small vessel ischemic disease
Bradbury-Eggleston syndrome	pure autonomic failure
Broca's aphasia	expressive aphasia, motor aphasia
Brown-Séquard syndrome	hemisection syndrome
Canavan disease	–
Chagas disease	American trypanosomiasis
Charcot-Marie-Tooth disease	hereditary motor and sensory neuropathy
Charles Bonnet syndrome	–
Cheyne-Stokes respirations	–
Syndenham's chorea	–
Chiari malformation	–
Churg-Strauss syndrome	eosinophilic granulomatosis with polyangiitis
Cockayne's syndrome	–
Cogan's syndrome	congenital oculomotor apraxia
Cori-Forbes disease, Cori's disease	debranching enzyme deficiency, glycogen storage disease type III, GSD III
Creutzfeldt-Jakob disease	subacute spongiform encephalopathy
Crouzon syndrome	craniofacial dysostosis
Cushing syndrome	hyperadrenalism, hypercortisolism
Dandy-Walker malformation	–
De Morsier syndrome	septo-optic dysplasia, septooptic dysplasia
Déjerine-Roussy syndrome	–
Déjerine-Sottas disease	hypertrophic neuropathy of infancy
Devic disease	neuromyelitis optica, NMO
Dix-Hallpike maneuver	–
Duchenne muscular dystrophy	–
Emery-Dreifuss muscular dystrophy	–
Fabry disease	alpha-galactosidase-A deficiency
Fazio-Londe disease	progressive bulbar palsy of childhood
Foster Kennedy syndrome	–
Friedreich ataxia	–
Gerstmann syndrome	–
Gower sign	–
Greenfield's disease	infantile metachromatic leukodystrophy
Guillain-Barré syndrome	acute inflammatory demyelinating polyradiculoneuropathy, AIDP
Hallervorden-Spatz disease	pantothenate kinase-associated neurodegeneration
Hartnup disease	–
Hashimoto encephalopathy	steroid-responsive encephalopathy associated with autoimmune thyroiditis, SREAT
Hoover's sign	–
Horner's syndrome	oculosympathetic palsy
Hunter disease	mucopolysaccharidosis type II
Huntington disease	–
Hurler disease	mucopolysaccharidosis type I
Isaac's syndrome	neuromyotonia, syndrome of continuous muscle fiber activity
Jacksonian seizure, Jacksonian march	–
Jendrassik maneuver	–
Kayser-Fleischer rings	–
Kearns-Sayre syndrome	–
Kennedy syndrome	spinal bulbar muscular atrophy, spinobulbar muscular atrophy
Kernig sign	–
Kernohan's notch	–
Klinefelter syndrome	XXY syndrome

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Eponym	Corresponding non-eponymous term
Klüver-Bucy syndrome	–
Korsakoff syndrome	–
Krabbe disease	globoid cell leukodystrophy, galactosylceramide lipidosis
Kufs disease	adult neuronal ceroid lipofuscinosis
Lafora disease	–
Lambert-Eaton myasthenic syndrome	–
Leber hereditary optic neuropathy	–
Leigh syndrome	subacute necrotizing encephalomyelopathy
Lennox-Gastaut syndrome	–
Lesch-Nyhan syndrome	–
Lewy bodies, Lewy body dementia	–
Lhermitte sign	–
Lisch nodule	iris hamartoma
Lou Gehrig's disease	amyotrophic lateral sclerosis
Machado-Joseph disease	spinocerebellar ataxia type III, SCA 3
Marchiafava-Bignami disease	primary degeneration of the corpus callosum
McArdle disease	glycogen storage disease type V, GSD V
Ménière's disease	–
Menkes disease	–
Millard-Gubler syndrome	–
Miller Fisher syndrome	–
Miyoshi myopathy	–
Möbius syndrome	–
Munchausen syndrome	factitious disorder
Niemann-Pick disease	–
Nonaka muscular dystrophy	–
Nothnagel's syndrome	–
Ondine's curse	primary hypoventilation syndrome, idiopathic hypoventilation syndrome
Paget's disease	osteitis deformans
Papez circuit	–
Parinaud syndrome, Sylvian aqueduct syndrome	dorsal midbrain syndrome, pretectal syndrome
Parkinson's disease	–
Parsonage-Turner syndrome	idiopathic brachial plexopathy, brachial plexus neuritis, brachial neuritis
Pelizaeus-Merzbacher disease	–
Pick's disease	frontotemporal dementia
Pompe disease	glycogen storage disease type II, GSD II
Prader-Willi syndrome	–
Ramsay Hunt syndrome	herpes zoster oticus
Raynaud phenomenon	–
Rett syndrome	–
Reye syndrome	–
Riley-Day syndrome	congenital dysautonomia, familial dysautonomia, heredetary sensory and autonomic neuropathy type III, HSAN III, HSAN 3
Rinne test	–
Ross syndrome	–
Roussy-Lévy syndrome	hereditary areflexic dystasia
Sandhoff disease	–
Schilder disease	–
Schwartz-Jempel syndrome	myotonic chondrodystrophy
Shy-Drager syndrome	multiple system atrophy
Sjögren syndrome	–
Smith-Lemli-Opitz syndrome	–
Strachan syndrome	–
Strümpell-Lorrain disease	hereditary spastic paraparesis
Sturge-Weber syndrome	encephalotrigeminal angiomatosis, encephalofacial angiomatosis
Takayasu disease, Takayasu arteritis	aortic branch disease, occlusive thromboaortopathy
Tangier disease	–
Tarui disease	phosphofructokinase deficiency, glycogen storage disease type VII, GSD VII
Tay-Sachs disease	GM2 gangliosidosis, hexosaminidase A deficiency
Todd's paresis, Todd's paralysis	postictal paresis, postictal paralysis
Tolosa-Hunt syndrome	–
Tourette syndrome	–
Uhthoff phenomenon	–
Unverricht-Lundborg disease	Baltic myoclonus, progressive myoclonic epilepsy type 1, EPM1
Valsalva maneuver	–
von Hippel-Lindau disease	–
Waldenström macroglobulinemia	–
Walker-Warburg syndrome	–
Wallenberg syndrome	lateral medullary syndrome, posterior inferior cerebellar artery syndrome, PICA syndrome
Wallerian degeneration	–
Weber syndrome	–
Wegener granulomatosis	granulomatosis with polyangiitits
Welander muscular dystrophy	–
Werdnig-Hoffmann disease	spinal muscular atrophy type 1, SMA1
Wernicke aphasia	receptive aphasia, sensory aphasia, posterior aphasia
Wernicke-Korsakoff syndrome	–

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Eponym	Corresponding non-eponymous term
West syndrome	infantile spasms
Whipple disease	–
Wilson's disease	hepatolenticular degeneration
Zellweger syndrome	cerebrohepatorenal disease

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