Prototype Semantics and the Emergence of Motor Vehicle Categories

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The entrants to the Chicago Times-Herald horseless-carriage race on Thanksgiving Day, 1895 were “the most astounding assortment of mechanical monstrosities.”

Hiram Percy Maxim, 1962:51

ABSTRACT

This article is in response to Anna Wierzbicka’s criticism that “the notion of prototype has to prove its usefulness through semantic description, or through semantic theorizing” (1990:305). I claim that the development of motor vehicle categories exemplifies the power of prototype imagery. The first era in the history of motor vehicles—an era of under-determination—was characterized by “technological anarchy” as some two-thousand makers produced one or more motor vehicles. This was followed by the decade of the 1890s which saw the emergence of prototypes for motor carriages as well as motorcycles. By the start of the twentieth century, the wide variation that characterized the 1890s had passed from the scene, and carriages with gasoline engines at the front and forward-facing passengers dominated. There is no more certain indication that a prototype existed than that of the steamers and electrics being superficially redesigned to conform to the prototype of the front-engine, gasoline driven carriage. This was done by both those who built steam driven and battery driven vehicles, and later by English three-wheelers. Further support for the value of prototype theory is drawn from the development of subcategories, when imitations of the anomalous Willys JEEP gave rise to the subcategory of SUVs. The strength of the prototype of the SUV was verified by the way in which the anomalous Hummer conformed to the image of the SUV rather than giving rise to a new subcategory of super cars.
1 Introduction

In 1990 Anna Wierzbicka challenged claims made with regard to prototype theory and demanded that “the notion of prototype has to prove its usefulness through semantic description, or through semantic theorizing” (1990:305), a demand made notwithstanding Eleanor Rosch’s (1978:28) presentation of prototype semantics as “explaining the categories found in a culture and coded by the language of that culture at a particular point in time....”

In this study I suggest that the history of how we got from the first attempts to build motorized road vehicles—“that astonishing assortment of mechanical monstrosities”—to what we currently recognize as the prototypical automobile constitutes a broadly based case study that demonstrates the efficacy of prototype semantic theory. I present a representative selection of the varieties of motorized road vehicles that I regard as sufficient to demonstrate the usefulness of prototype semantic theory and to meet Wierzbicka’s demand.

These motor vehicles provide a significant test of the concepts associated with prototype semantic theory for a number of reasons.

- **Prototype** may be defined as a conceptual abstraction that underlies the exemplars of a category. It is grounded in the perception of basic-level images. Moreover, it entails that there be more than one exemplar in a category. Solitary exemplars—individual such as Henry Kissinger (cf. Lakoff 1974) or an anomaly (e.g., the post-WWII Jeep)—are not subject to prototype analysis. Rather, until the category is expanded with additional exemplars, it is often best described by analogical thought such as metaphor.

- In the early stages, carriage bodies were custom produced, often from wood, by artisans and craftsmen who frequently had already been crafting custom carriages to be drawn by horses. It was a period of experimentation as the craftsmen reconfigured the components of the carriages to achieve a maximal integration of the motor and to meet the requirements of transporting passengers and/or cargo. Only a small number of motorized road carriages were independent creations.

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1Throughout his career, Karl Franklin has researched the nexus of language and culture and has encouraged others to do likewise. Recently he wrote of how the Kewa people created metaphors to identify automobile parts (Franklin 2003), and so I write this essay in appreciation of his friendship and encouragement over many decades.

2In most cases I could illustrate a point with multiple exemplars. Moreover, I make no pretense of presenting a comprehensive survey of all motorized road carriages. Georgano’s *Complete encyclopedia of motorcars 1885 to the present* (i.e., 1968) incorporates over four thousand makes of cars, but in so doing he excluded hundreds of one-only specials. Bailey (1971:52) reports that a late 1890s issue of *The Horseless Age* notes that more than three hundred companies or individuals had been engaged in making motorized road carriages.

3Richardson, et al. write, “Cognitive linguistics and experimental psychology have produced tantalizing hints that a substantial portion of language is encoded in the mind in the form of spatial representations that are grounded in perception and action” (2001:845).

4Rosch points out that a prototype requires two or more representatives: “To speak of a prototype at all is simply a convenient grammatical fiction; what is really referred to are judgments of degree of prototypicality. Only in some artificial categories is there by definition a literal single prototype.... For natural-language categories, to speak of a single entity that is the prototype is either a gross misunderstanding of the empirical data or a covert theory of mental representation” (1978:40).
Motor vehicles represent a comparatively recent phenomenon with a rapid differentiation of its categories. Moreover, the contexts and conditions in which motor vehicles were invented and developed are well documented.

2 The dawn of motorized road vehicles

Although it could be argued that the age of motorized road vehicles dawned in the early nineteenth century with the development of steam engine technology and its application to the propulsion of road carriages, most historians choose to date it towards the latter part of that century when a number of inventions and discoveries enabled designers considerably more freedom in crafting a road carriage.

In the nineteenth century when oil was distilled to get kerosene for lighting, a highly volatile, liquid by-product—a coal tar distillate now known as gasoline or petrol—was discarded as useless. What is important was that it was available when the need arose for a liquid with an explosive power sufficient to power engines. In 1876-77 there were two significant inventions. The first was Gottlieb Daimler’s invention of the carburetor for vaporizing gasoline and mixing it with air. The second was Nicolaus Otto’s invention of the first practical, four-stroke, internal combustion engine. The most inventive individual was Karl Benz who has been credited for a number of collateral inventions: a battery-powered ignition system that enabled fuel to be ignited inside an engine rather than from the outside by a flame, the spark plug, the clutch and differential gear shift (1885). The carburetor and electric spark plug gave mobility to what had been a fixed internal combustion engine. Furthermore, the greater power of gasoline meant that much less fuel needed to be carried along with the now mobile engine.

In the late 1880s, a Frenchman, Leon Serpollet, invented a compact flash boiler which gave new life to the steam carriage. Its use of oil as the fuel, rather than coal, gave it greater efficiency and obviated the need for a stoker. Because it required much less hot water under pressure than did the older boilers, it was very compact and much safer. The net result was that the power unit had space requirements comparable to those of the gasoline engine.

For the first time road carriage designers had powerful, compact, and mobile engines to propel their road carriages, and the search was on to design the most efficient and user-friendly horseless carriage. They were faced with adapting engines to fit previously horse-drawn buggies, buckboards, carriages, or wagons. Accordingly, their work was largely experimental. Their search is illustrative of how prototypicality emerges and categories develop.

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5The world’s first successful combustion engine was produced in 1860 by the Frenchman Étienne Lenoir. Its main drawback was that its coal gas and air mixture had to be ignited from outside the cylinder. All forms of external ignition were regarded as unsafe, and in 1875 the Joint Congressional Committee on the Horseless Carriage recommended congressional control over the development and use of all sources of gasoline and similar explosive elements because “the discovery in which we are dealing involves forces of nature too dangerous to fit into any of our usual concepts” (Bailey 1971:50-51).
3 The age of under-differentiation

With reference to the period 1905-1912, T. R. Nicholson writes,

Public taste was not yet so standardized that the products of such concerns [i.e., small-scale companies that produced a myriad of vehicles] could not be of unusual design in some respects.... [T]his was a time of considerable variety and interest, in spite of the basic and accelerating tendency for design to settle down. It was a highly transitional period between the fascinating technological anarchy of the previous age [1863-1904, see Nicholson 1970] and the conformity of the next [1913-1923, see Nicholson 1972]. (1971:10–12)

His reference to the “technological anarchy of the previous age” undoubtedly relates to the fact that in the United States almost two thousand separate concerns produced one or more motor vehicles. After the turmoil of this period subsided, only about one hundred companies were still in business in 1920 and only forty-four in 1929.⁶

No one could foresee what would happen when horses were replaced with other sources of power, and no one had a clear image of what a motorized road carriage should look like. Nicholson (1971:5) notes, “While general trends were in certain directions, experiment was the rule: this was a period of exploration in a new medium, of settling down. Anything went, in the metaphorical if not always in the literal sense.”

These entrepreneurs produced a wide variety of specimens, not clearly differentiated in terms of categories: tricycles, also known as tricars, velocipedes, or autocars; four-wheeled horseless carriages, also known as motorwagons, QuadriCycles, or QuadCars. Many had mixed characteristics and so could be regarded as “blends,” or “cross-overs.” The wide variety of carriage designs and the indecisiveness in naming them demonstrate a stage of road carriage development prior to the differentiation that led to our familiar categories of automobiles and motorcycles. So it is not surprising that the development of both our automobiles and motorcycles may be traced back to this group of undifferentiated motorized road carriages.

My focus is on those features that are central to the imaging of motorized road vehicles. This imaging is considered with reference to a given vehicle’s profile and also to salient features, such as the replacement of a tiller by a steering wheel in the case of horseless carriages and the loss of pedals in the case of motorcycles.⁷ It is important to note that trends developed slowly so that there were always some manufacturers who continued to produce outmoded designs.

G. N. Georgano, in deliberating over which vehicles to include in The Complete Encyclopedia of Motorcars 1885 to the Present, writes of the difficulty in


⁷This focus does not mean that human bodily interaction is unimportant. On the contrary, it is, as evidenced by the abandonment of some configurations, such as Copeland’s steam-driven American Star bicycle (fig. 6), which must have been difficult to control, and the 1901 Sunbeam Mabley with its unusual wheel and passenger placement (fig. 39).
distinguishing between a tricycle and a three-wheeled car. He cites the 1885 De Dion Bouton (fig. 1) as “obviously of the motorcycle family,” and mentions that after 1903, a “race” of carriages of motorcycle descent appeared which gradually took on the appearance of a tandem car on three wheels (1968:11-12). Motorcycle characteristics, in contrast to motorcar characteristics, were said to include a cycle-like frame instead of a chassis, a driver’s saddle instead of a seat, handlebars instead of a steering wheel, and a wickerwork passenger seat. He writes, “With makes such as the Riley, it is almost impossible to decide at what point they became cars” (1968:11-12). Perhaps he had in mind the 1905 Riley Tricar (fig. 2), although much earlier, in 1869, a very similar tricar was built by Léon Bollée (fig. 3). He includes the more car-like road carriages, while excluding those “which never progressed beyond saddle, handlebars, and wickerwork….” (1968:11-12). I have already noted that the same class of vehicles was called “QuadriCycles” and “QuadCars.”

On the one hand, many designers of motorized carriages of that era simply adapted a motor to an existing carriage frame, e.g., the 1886 Daimler Motor Carriage (fig. 4). Michael Sedgwick (1962:11) regards it as “no more than a beefed-up horse carriage with an engine sticking up out of the rear floor.” For steering it retained the pivoting carriage axle. A belt drive ran from the engine to the rear wheels with two speeds, depending on the tightness of the belts.

On the other hand, Benz designed his 1885 Patent-Motorwagon as an entity (fig. 5). It seated two people, but had very few of the features which came to be typical of cars in the early twentieth-century. Not only did he build it with only three wheels, he also used the wire-spoke wheels associated with bicycles rather than the wooden spoke wheels associated with horse-drawn carriages and wagons.8

8Coleman (1971:15–26) cites Siegfried Marcus as “driving around in a cart powered by a two-stroke engine” in 1865 and having built the first motor car in 1875. The conflict is that Coleman says that the 1875 car had a four-stroke internal combustion engine, but then he attributes the discovery of the four-stroke engine to Otto [in 1876], who “turned away from steam to develop an internal combustion engine which ran on coal gas” (1971:16). Coleman concedes it to be true to regard Benz as the “father of the automobile industry” because “his thinking was in terms of a marketable product” (1971:18).
Other designs of three-wheeled carriages with the third wheel in front include Copeland’s first attempt at motorized travel in the early 1880s when he fitted a small steam boiler to an American Star “ordinary bicycle” (fig. 6), with the wheel differential of the traditional British penny-farthing bicycle, but with the wheels reversed. One can only wonder about its road-handling ability. By 1888 he had reduced the wheel differential in the Copeland Tricycle (fig. 7), and the 1895 Knight nearly eliminated it (fig. 8).

In contrast to Benz, some designers positioned the third wheel at the back of carriage—the 1896 Pennington Autocar (fig. 9) and the 1896 Léon Bollée tandem Tricar (fig. 10).

Some other early attempts at designing a four-wheel motor vehicle consisted of utilizing two bicycle frames with varying degrees of modification to the frames. The 1895 Ames-Bailey attached two bicycle frames to the bottom of a carriage with little modification to the frames (fig. 11). Even the sprockets and
chains of the bicycles were retained. Compare the 1895 M. H. Daley carriage (fig. 12), which retained the frames and the forks, but positioned the bottom of the carriage at the level of the wheels' hubs. The designer incorporated a handle bar which extended the full width of the carriage, but dismissed most of the remaining bicycle-like components. The Kane-Pennington carriage that was entered in the 1895 Chicago Times Herald race retained much of the two bicycle frames it incorporated and provided skirts to cover the rear wheels (fig. 13). Note the forks and the tubular handlebar-like extension.

A clear similarity with bicycles is also evident in the 1899 Beeston QuadriCycle (fig. 14), which retained the pedals to supply power along with the engine, a common practice. In 1893 Peugeot built a more sophisticated QuadriCycle apparently modeled after the horse-drawn Phaeton carriage. Although it retained the wire wheels of the cycle family, it lacked most of the bicycle-like characteristics of its predecessors (fig. 15). By 1899, the only bicycle characteristic of the Alldays Traveller was the wire wheels. In all other respects it resembled a carriage (fig. 16).

4 Emergence of a prototype of the motorcycle

Although there were at least three motorized cycles which could be regarded as forerunners of the two-wheel motorcycle, the line of descent from these, if any, passes through the three-wheeled cycles which were competing in the late 1880s with the quadricycles. The early attempts were isolated experiments in fitting a steam engine to bicycles, and it was not until the late 1890s, after the internal combustion engine had been successfully adapted to the tricycles and
quadricycles, that two-wheel motorcycles emerged as a distinct subcategory with prototype imagery.

L. Scott Bailey (1971:35) reports that during the 1860’s a demand grew for steam-driven bicycles and tricycles, and eventually these formed a distinct category known as *Velocipedes* ‘fast foot’ in contrast to the more common four-wheel steam buggies, carriages, and wagons. In response to this demand, in 1869, Pierre and Earnest Michaux in France (fig. 17) and S. H. Roper in the United States (fig. 18) attached small steam engines in different positions to bicycle frames. In 1885 Daimler constructed a two-wheeled cycle with small, side-mounted stabilizing wheels (fig. 19), similar to our training wheels.

![Fig. 17: 1869 Michaux-Perreaux Velocipede—Louis and Currie 1976:14](image1)
![Fig. 18: 1869 Roper steam Velocipede—Louis and Currie 1976:14](image2)
![Fig. 19: 1885 Daimler—Louis and Currie 1976:14](image3)

Until the beginning of the twentieth century, cycle enthusiasts innovated and placed the new, lightweight engines in all sorts of imaginable places resulting in what Richard Hough and L. J. K. Setright (1966:15) call “an astonishingly haphazard variety of designs.” Most such early cycles retained the pedals, a fact that may have contributed to the flexibility in its placement. The 1899 Werner (fig. 20) demonstrates such flexibility with the pedals supplying power to the rear wheel and an auxiliary engine mounted in front of the frame and below the handle bars supplying power to the front wheel. Through the 1890s, however, a number of designers produced cycles which were not substantially different from the 1885 Daimler. Note the conformity of the 1894 Hildebrand and Wolfmüller (fig. 21), and the 1899 Holden (fig. 22).

![Fig. 20: 1899 Werner—Louis and Currie 1976:24](image4)
![Fig. 21: 1894 Hildebrand and Wolfmüller—Louis and Currie 1976:24](image5)
![Fig. 22: 1899 Holden—Louis and Currie 1976:24](image6)

In 1901 the Werner brothers produced a design (fig. 23) which relied solely on engine power and exhibited such outstanding handling and balance that it

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9 Oliver and Berkebile (1968:24) note that the Roper frame, held in the Smithsonian Institute, shows signs of having been forged expressly for this vehicle.
was a resounding success (Louis and Currie 1976:11). It set the standard that other manufacturers emulated, e.g., the 1902 Humber (fig. 24) and the 1911 Douglas (fig. 25).

The result was the emergence of a prototype image for motorcycles. Henceforth, the majority of motorcycles located the engine in a low, central position on the frame above the main drive sprocket, so that the power could be transferred to a rear wheel sprocket by means of a chain. The image persists to this day, and it may be reasonably said that since the beginning of the twentieth century the motorcycle has only changed incrementally as manufacturers improved the basic design.

5 The age of technological anarchy in the design of motorcars

I have already noted that Nicholson (1971:10–12) refers to the time prior to 1905 as the age of “technological anarchy,” which I attribute to designers having lacked any prototype image that could serve as a standard upon which to base their designs.

No one knew where the power source could be safely located—at the rear, up front, or slung under the middle of the carriage. Neither was there any assurance as to how the power could best be transmitted from the motor to the wheels—by chains, belts, or by a direct drive. In the late 1880s and early 1890s the designers of motorized passenger carriages usually positioned the engine amidships and below the vehicle's floor in line with the axles, so that power could be transferred most efficiently to the wheels by means of belts or chains. Alternatively they placed the engine behind the carriage just above the axle which also allowed an easy connection with the rear wheels.

The designers had differences of opinion regarding which kind of wheels would best suit the carriage—wheels with wire spokes such as those of bicycles, or with wooden spokes such as those of wagons—and what kind of tires would be most suitable—pneumatic, solid rubber, or wooden wheels clad with steel. Moreover, how many wheels were needed—four, such as those of the buggies, carriages, and carts, or could they get by on just three? What about suspension? Many of the early motorized road carriages had curved iron springs just like those used on horse drawn coach (Sutton 1990:6). And most important, where
could passengers be seated, and might one of the passengers also serve as the operator?

5.1 Motor and drive train placement

Most early horseless carriages were rear-wheel driven, by chains or belts connected to the motor. This virtually required the motors to be located centrally, beneath the carriage as in the 1988 Daimler (fig. 26), or behind the seat(s) as in the 1896 Ford (fig. 27). The front-wheel drive 1910 Phänomobil's (fig. 28) location of the motor mounted in an elevated position above the front wheel certainly contributed instability to the vehicle, and Nicholson (1971:10) regards it as “one of the strangest creations to emerge from any car factory anywhere”—yet the company survived for twenty years.

5.2 Passenger placement

Benz' 1885 Patent Motorwagon (fig. 5) had a very basic, single bench seat. Some thirteen years later, the stylish 1898 Gräf had what in comparison must have been a very comfortable bench seat (fig. 29).

The problem that designers faced was how might additional passengers sit. Should they sit sideways facing each other behind the operator as in the 1901 Albion (fig. 30), sit in tandem in a smaller front seat facing forwards as in the 1905 Peugeot (fig. 31), or sit facing the operator as in the 1900 De Dion-Bouton (fig. 32). This style, known as the vis-à-vis seating arrangement, enjoyed short-lived popularity and was used by a number of manufacturers through the 1890s. The reverse seating, i.e., with two seats centrally located back-to-back, known as the dos-à-dos, was featured with the 1901 Arrol-Johnston (fig. 33). Although both styles faded in popularity around the beginning of the twentieth century, one may reasonably suggest on the basis of their short-lived popularity that people were beginning to develop a prototype image for the personal motor vehicle.
Other innovative placements of an additional seat were those of the forward-facing, rear “spider” seat of the 1892 Keller-Dagenhardt (fig. 34) and the flimsy seat located in a low, frontal position—the “mother-in-law seat”—of the 1886 Peugeot QuadriCycle (fig. 35). With its position well beyond the front wheels it afforded little protection for the passenger. Such an exposed frontal seating persisted for years, but was associated more commonly with vehicles that had tandem seating such as the 1896 Léon Bollée Tricar (fig. 10).

5.3 Number of wheels and their placement

How many wheels might a horseless carriage have? Three as with the 1885 Benz Patent Motorwagon (fig. 5), the four of the 1894 Benz Velo (fig. 36), the six of the 1908 Otav (fig. 37), or eight as with the 1911 Reeves Octo-Auto (fig. 38). There were always the truly innovative designers whose oddities had a very short-lived existence, such as the very unusual “plus-sign” wheel placement of the English 1901 Sunbeam Mabley (fig. 39) that entailed unique, in-line passenger seats facing both sides. The front seats required entry from the left in
front of the wheel, and the rear seats required entry from the right behind the wheel. Needless to say, this design did not achieve widespread acceptance, and only 130 units were produced.

What is the significance for semantic theory of this diversity in the forms of early motorized road vehicles? I suggest that this diversity may be best explained in terms of prototype semantic theory on the basis that in the latter half of the nineteenth century the designers of motorized road vehicles lacked any basic-level imagery that could serve as a prototype. The category was abstract and under-differentiated in comparison to present day categories.

If we superimpose the images of the earliest representatives of motorized road carriages, the amount of overlap would be insufficient for us to form an adequate image of a motorized carriage. I will return to this point later when considering the SUV subcategory and raise the issue of image strength and stability with regard to a prototype.

6 The emerging prototype for the automobile

By the mid-1890s a number of significant trends had developed in motor carriage design. First, the front and rear wheels became equally sized and lost the look of horse-drawn carriages which had larger rear wheels. Secondly, designers began to substitute wooden spokes for wire spokes. Thirdly, the tiller was giving way to the steering wheel. Many of the carriages had the engine located either behind or below the main bench seat. Seating for additional passengers was generally located forward and positioned slightly above the front wheels. All that was to begin to change due to a major innovation in 1894.
In 1894 the Frenchman Emile Levassor produced a totally new design when he placed a Daimler engine (for which he had the French rights) at the front of the carriage, located the clutch and gearbox centrally underneath the body, and positioned a differential between the rear wheels. This was essentially the configuration which has been dominant through most of the twentieth century, until the recent trend to front-wheel drive. With his partner, Louis-René Panhard, he produced the 1894 Panhard-Levassor (fig. 40).

The most distinctive feature of the front-engine Panhard-Levassor model is the lack of a secondary seat above the engine-radiator compartment. This was a clear indication that the compartment contained a gasoline-powered engine and a radiator. Furthermore, when secondary seating was added, it was added as a rear seat immediately behind the driver’s seat. The result was that the prototype of four-passenger, front-engine cars emerged rather quickly. George Oliver writes, “The Panhard layout immediately influenced the appearance of those makes that followed it and gradually a distinctive type evolved, with front-mounted, enclosed engine behind which driver and passenger, or passengers, sat, far above the ground” (1981:30). Examples include the German 1897 Daimler Victoria (fig. 41) and the Austrian 1898 Gräf, which had a single seat and an exposed engine and radiator (fig. 29).

One of the most influential events in the emergence of a prototype image, especially in North America, was the New York Auto Show of November, 1901 when two European trends were introduced. The first was the European-styled touring car as exemplified by the German-built, 1901 Mercedes (fig. 42) and the French-built, 1901 Mors (fig. 43). This design was widely accepted and emulated, as exemplified ten years later by the 1910 Hudson Touring Car (fig. 44).

At the beginning of the 20th century, the wide variation that characterized the 1890s had passed from the scene, and carriages with engines mounted at the front and passengers facing forward dominated. Paul Wilson writes,
The shift in public taste [in America] in favor of the front-engined look occurred with startling rapidity. At the beginning of 1900 there were no front-engined cars being built in America, and motorists showed either apathy or active dislike for their appearance. At the end of 1901, however, opinion was almost unanimously in favor of front-engined style, and many people expressed distaste for the old forms. (1976:20–24)

Moreover, the new century marked a turning point in the way that people thought of, and categorized, their motor vehicles. Before 1900, the automobile was known as a carriage, and the mechanical aspect of the automobile was unemphasized and hidden. After 1900, the term carriage was replaced by machine and the size of the hood was important. Kimes and Clark (1989:1066) describe this trend as one of moving from the “buggy type to automobile.” The front-end engine with the large hood became for motorists the symbol of power that had once belonged to the team of horses, and Americans fell in love with the “beastly mechanism” of the automobile (Wilson 1976:24–25).

7 Conforming to the prototype of a front-engine motorcar

There is no greater indication that a prototype image has emerged than when marginal or atypical exemplars are reshaped to conform to a more central exemplar. In the development of motor vehicle categories we see this in how the early steam-driven carriages and the “electrics” (i.e., battery-driven) took on the shape of a front-engine, gasoline-driven carriage.10

Many designers resisted making substantive changes to the basic configuration of the engine-under-seat chassis. But, because the front-engine carriage was becoming widely accepted, they decided to create the appearance of a front-engine carriage by adding a false hood. This trend was exemplified in the changes from the 1900 Packard Model B (fig. 45) with a 76 inch wheelbase and an almost nonexistent hood to the 1903 Packard Model F (fig. 46) with an 88 inch wheelbase and an elongated sloping hood. Both models retained the engine-under-seat chassis, and it was not until the 1904 model that Packard actually moved the engine to the front.

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10William Morrison invented the automobile storage battery in 1891 and the electric automobile a year later.
7.1 The conformity of the steam-powered carriages

Further evidence that a prototype image for motor vehicles had developed during the decade of the 1890s is found in how the designers of a new generation of steam-powered carriages in the twentieth century went to great lengths to make them look like their gasoline-powered counterparts. Compare the 1897 Stanley Steamer Runabout (fig. 47), which had the engine and boiler mounted behind the seat and had only a simple dashboard at the front, with the 1902-3 Stanley Steam Car (fig. 48), which had the boiler relocated in a compartment at the front. The result was that the reconfigured 1902-03 model bore a stronger resemblance to a gasoline powered carriage.

An even more dramatic redesign is that from the 1901 to the 1903 White steamers. The 1901 model (fig. 49) had the engine and boiler compartment behind the seat, a very minimal dashboard at the front, and tiller steering. Its profile was very reminiscent of the horse-drawn buggy. The 1903 model (fig. 50) had a very different profile. The engine was relocated below the rear seat, and the condenser was placed in an elongated front compartment with a long sloping hood. It had seating for four passengers in what has become the traditional front-rear seating configuration, and a steering wheel. Its profile was very similar to those of the contemporary gasoline powered carriages. Wilson (1976) attributes this radical redesign of the White to the fact that the designers of steamer-powered vehicles were joining the trend toward the European-styled, front-engine cars featured at the 1901 New York Auto Show that was dominated by the highly influential 1901 Mercedes (fig. 42).
The Stanley Steamers company continued to produce steam-powered cars which closely modeled the gasoline-powered counterparts right up into the 1920s. Although they located the engines at the rear of the carriage, they conformed to the emerging prototype by having a false engine compartment at the front. Note the profiles of the 1909 Stanley runabout with the boiler up front and a rear mounted engine (fig. 51) and the 1920 Model 735 with the elongated hood (fig. 52). “By 1920 Stanleys had a flat radiator and from the outside resembled a gasoline car completely, even to a [false] radiator fill cap. But underneath the boiler was still up front, and the engine still driving direct on the rear axle” (Kimes and Clark 1989:1331).

7.2 The conformity of the electric carriages

Although carriages powered by batteries had considerably greater flexibility in body design, their styles were consistent with those of vehicles powered by gasoline and steam. The batteries could be placed almost anywhere that steam or gasoline engines could. If the batteries were placed under the floor of the carriage, where many of the early gasoline powered vehicles had the engine, and if the gasoline powered carriage had the engine enclosed, the two carriages looked very much alike. The 1899 Baker Electric (fig. 53) is of this type. The 1904 Columbia (fig. 54) had a profile much like the gasoline-powered carriages with the engine at the front. Clearly the gasoline-powered carriages were setting the trend for automobile design. This conformity persisted right up to the demise of the electrics. The 1922 Chelsea Electric Coupe (fig. 55) even had a “simulated radiator in a front grill assembly” (Shacket 1979:15).
Electric carriages were popular with women because they often had difficulty in hand-cranking the gasoline powered cars, and were especially popular in New York and other Eastern cities, where short trips across town were the norm. Shortly after the invention of the electric starter in 1911, the gasoline-powered vehicles quickly supplanted the electrics.

7.3 The conformity of the three-wheelers

As we have seen, three wheelers from the late 1800s, particularly during the decade of the 1890s, had the third wheel in the rear (figures 1–3, 9–10). This typical configuration persisted into the mid-twentieth century and is represented by the Messerschmitt vehicles of the 1950s which feature tandem seating not unlike the early three-wheelers. There is little change from the 1953 Messerschmitt KR-175 (fig. 56) to the 1964 Messerschmitt KR-200 Roadster (fig. 57).


Although the 1957 Reliant Regal Mk III and the 1963 Bond Estate have the third wheel in the front, their front ends with false fenders resemble the profiles of automobiles with four wheels (fig. 58). This conformity clearly highlights the observation that the prototype image of an automobile was that of a four wheel vehicle.
8 Anomalies as nascent categories

The history of the automobile is replete with anomalies, as independent entrepreneurs experimented with a wide variety of novel designs in the hope of capturing the consumers' interests. Such one-of-a-kind novelties contribute little, if anything, to our understanding of how categories emerge unless they catch the imagination of other designers who produce similar models. Too often they reflect nothing more than the creative thought of aspiring entrepreneurs seeking to design unique, but marketable, vehicles. That such one-of-a-kind novelties were not embraced by the consumers simply illustrates that their novelty exceeded the acceptable limits of the prototype image.

What is of greater importance to our understanding of the role of prototype imaging in the development of categories are those vehicles, which began as somewhat anomalous, but succeeded in so meeting the needs of the populace that other manufactures designed and manufactured similar models. It is in this similarity that we can recognize an emergence of a prototype image that eventually serves as the basis for a new subcategory.

8.1 Mass production and the emergence of the subcategory raceabout, runabout, or speedster

One of the most important developments was that of mass production. I have noted that early motorized carriages were generally fitted with bodies custom-built by craftsmen who had been in the horse-drawn carriage trade. Floyd Clymer (1953:147) reports, “Many bodymakers offered their own custom-built jobs complete and ready to attach to their own chassis, while others offered them in knockdown form.”

Henry Ford is famous for introducing assembly line manufacturing, and in time such manufacturing reduced the number of artisans building individual bodies. The sheer volume of Ford Model Ts built during the nineteen years from
1909-1927 was staggering. In comparison to the few thousand vehicles built by Rolls-Royce, the Ford Company built an astounding 15,456,868 Model Ts (Stein 1961:165). Indeed, by the mid-1920s Ford had built half of the vehicles being driven in North America.

His marketing of the Model T chassis presents a case study of how a subcategory may emerge from individual efforts at designing a satisfying body style. Of particular relevance to prototype imaging is Ford’s practice of selling to the general public new, stripped-down chassis which could be fitted with almost any shape of body (fig. 59). One has little difficulty in recognizing the Model T profile in the body style of the 1910 Ford Runabout (fig. 60).

Clymer (1953:147) notes regarding the Model T, “Other bodymakers went after the business of the Model T owner who was interested in disguising his car. While every owner knew that the Model T had economy and endurance, some owners wanted to dress up their car to make it look like something more than just an ordinary Model T.” Bob Stubenrauch (1973:95) notes of the 1915 Ford Model T Speedster, “It should be stated immediately that Ford built no true production speedster or raceabout-bodied Model T’s.” Consequently, Stubenrauch calls it a “barnbuilt Ford.” The customers would buy a factory-new chassis and remove the fenders, the running boards, and the windshield. Then they would lower the silhouette by moving the gas tank from underneath the seat to behind it so that the seat could be dropped. Next they would rake the steering to fit the lowered seat, fit a custom made aluminum body, and change the suspension because the bouncy traverse springs made the vehicle uncontrollable at high speed. The very fact that these individuals did not replicate the trial and error experimentation of their nineteenth century predecessors who created what Hiram Percy Maxim (1962:51) regards as “mechanical monstrosities” suggests that they had recourse to prototype images. As individual consumers bought the chassis and then designed their own body styles, they were expressing their own image of what a vehicle ought to look like. When enough people built similar models the outcome was the emergence of a new subcategory, the “Run-abouts.”
8.2 The short-lived subcategory of the High-wheelers

In 1901 the Holsman company began production of a vehicle that would meet the needs of mid-Western farmers, exemplified by the 1903 Holsman (fig. 61). It was joined in 1905 by a major competitor, International Harvester, which produced the Auto Buggy, “designed to look as much as possible like a horse drawn buggy” (Gibbins and Ewens 1978:28). IH’s vehicle was designed primarily for carrying produce (fig. 62), but it also accommodated an added back seat which was handy for taking the family on outings (fig. 63). It’s design was adopted by a number of small manufacturers, and the production of a number of models that were similar in many respects led to the emergence of a prototype image for the subcategory of passenger carriages known as High-wheelers (with wheels 44-48 inches high). The 1907 Kiblingen Highwheeler was clearly better appointed and more comfortable than its predecessors (fig. 64).

The high-wheelers, in general, represented independently designed specialty wagons rather than simply adaptations of existing horse-drawn wagons. To meet the needs of farmers it had first to have an adequate road clearance for traveling over the deeply rutted country roads and second to carry farm produce as well as the farmer’s family. What drove them into bankruptcy was the Ford Motor Company retailing the stripped-down Model T chassis in 1909, with 30 inch wheels, that could be custom-designed to satisfy the individual farmers. The Holsman Company went into liquidation in 1910 and in the following year International Harvester closed its passenger division.
8.3 The Willys Jeep—an anomaly that gave rise to the SUV category

The subcategory of SUVs may be traced back to the Willys Jeep (from GP for the World War II American General Purpose Vehicle). That both the high-wheelers and the Willys Jeep met specific needs not met by other vehicles enabled them to survive. The Jeep gained renown during World War II as a vehicle that could go almost anywhere. Its off-the-road capability was legendary, and as the war closed it was adapted for civilian use. It was fitted with a special power take-off which could be used for almost any agricultural task.

This [1946 CJ] Jeep (fig. 65) was the first vehicle to combine the functions of passenger transport, light truck, tractor, and power source.... On farmland it could travel with the same ease as the wartime MB [Jeep]. It could also plough, haul loads of hay bales or grain, pull a harrow, thresh, fill a silo—in fact do just about any agricultural task by itself, or as a tractor or power source. (Clayton 1982:63).

Furthermore, that each of these anomalous vehicles gave rise to a subcategory informs us about the role of prototypicality in the emergence of subcategorization. In both cases the initial offering of a new design for a vehicle was emulated by other companies. Whether or not the resultant category survived depended more often than not on purely economic factors related to competition in the marketplace.

In contrast to the demise of the high-wheelers in the face of competition with the Ford Model T, the Jeep had no serious competition for more than a decade, so that when such competition arose, the Jeep was thoroughly entrenched. The result was that as other companies emulated the design of the Jeep there arose the category of SUVs that has grown and expanded over a period of almost fifty years.

In the late 1940s and early 1950s, an American folk classification of vehicles included just three broad subcategories: cars, trucks, and the Jeep. While the first two categories had a wide range of representative models, the Jeep virtually stood alone, a true anomaly, and it remained so, without any serious competition, for more than a decade. Its military origins remained evident through the 1970s and early 1980s, as exemplified by the 1975 Jeep CJ5 (fig. 66), and were mitigated only slightly in its successor, the Jeep Wrangler series (fig. 67).
Subsequent competitors to the Jeep that contributed to the emergent prototype for SUVs included the 1961 International Scout. In 1965 the Scout was significantly restyled to resemble a passenger sedan. Ford's entry into the market in 1966 with the Ford Bronco Wagon (fig. 68) induced Jeep to introduce the 1967 Jeepster Commando (fig. 69), and in 1969 Chevrolet joined the field with the Blazer (fig. 70). Jeep took on all the competition with serious intent in 1974 with the introduction of the Cherokee (fig. 71). 11

It is illuminating to compare the early experiments in designing satisfactory motorized road carriages in the late 1800s and early 1900s with the more sophisticated approaches in designing vehicles in the 1960s that eventually led to the emergence of the SUV subcategory. I have noted that the “technological anarchy” for that early period as reported by Nicholson (1971:10–12) may be attributed to the fact that the designers had no prototype image that could serve as a standard upon which to base their designs. By the 1960s, however, designers not only had strong prototype images for the various categories and subcategories of vehicles, but they also had a paragon for the emerging SUV subcategory in the highly popular CJ Jeep. Thus, in contrast to the extreme diversity in the designs for motorized road carriages produced at the end of the nineteenth century, we find that the designs for the emerging subcategory of SUVs during the 1960s exhibited technological sophistication and homogeneity emerged very quickly.

11The first vehicle styled after the Jeep was the British-built 1948 Land Rover which had much the same measurements as the Jeep. In 1970 it was joined by the more luxurious Range Rover. The Rover vehicles, however, were not widely marketed in the U.S. and so provided no real competition for the Jeep nor contributed significantly to the emergent prototype for American SUVs.
This homogeneity is clearly evident in a comparison of the photos of 1992/3 models with their counterparts of twenty-five to thirty years earlier. Compare the 1969 and 1993 Chevrolet Blazer (fig. 72 and 73), the 1974 and 1993 Jeep Cherokee (fig. 74 and 75), and the 1979 and 1993 Dodge Ramcharger (fig. 76 and 77). If one were to superimpose these images, the amount of image overlap would be astounding in comparison to that which would be attained by superimposing the images of the motorized road carriages of the late 1800s.

I suggest that these differences between the performance of the nineteen century designers and those in the post-WWII era may be accounted for by the concept of “prototype strength”—that there is strength in numbers, in the similarity in shapes, and in the identifiability of averaged shapes (Rosch 1978). If a putative category has only a few representatives that are widely divergent in their shapes, as was the case for motorized road carriages at the end of the nineteenth century, it is unlikely that such a collection would easily yield a prototype image upon which a basic-level category may be based. On the other hand, if a putative category has a large number of representatives and there is a great similarity in their shapes, then it is highly likely that a prototype image will emerge and serve as the basis for a category. Simply stated, the latter designers had a firmly entrenched prototype.
8.4 The Hummer—an anomaly that became an SUV

That the prototype for an SUV is firmly entrenched is evident in light of the introduction in 1991 of another anomaly, the Hummer 1 (fig. 78). During the Gulf War the capabilities of the military Humvee (from HMMWV—High Mobility Multi-Purpose Wheeled Vehicle) became widely recognized, and its manufacturer, AM General, decided to market it in 1992. AM General’s decision is directly analogous with that of Willys to market the CJ Jeep following World War II. There is, however, a significant difference. Whereas the Willys Jeep found a ready market niche and had no competition, the Hummer H1 faced a daunting array of SUV competitors.

The introduction of the H1 was analogous with that of the CJ Jeep in another way. Both were essentially military versions in civilian dress. The H1, however, in comparison with SUVs, was clearly the ugly duckling of vehicles. It was a behemoth, and at nearly 7,000 lbs was far larger than the typical SUV and earned the nicknamed “The Giant.” During the next eleven years fewer than 10,000 were sold. In 1999 General Motors acquired the Hummer name, along with marketing and distribution rights. In 2002 the introduction of the Hummer H2 (fig. 79) was the first of two size reductions, with some body re-sculpturing, that culminated in the H3 in 2005 (fig. 80).

The first adjustment resulted in building the H2 on an SUV chassis—that of the GM Chevrolet Tahoe. It weight was reduced to 6,400 lbs., and it was just short of seventeen feet in length. Its body had softer edges, and it came with options such as a leather interior and a premium audio system. The second adjustment with the H3 shortened it by another foot and a half and cut the weight by a ton. The H3 shares the GMT-355 platform with two “siblings”—the mid-size Chevrolet Colorado and GMC Canyon pickups. It now conforms to the profile of a mid-size SUV—clear evidence that an SUV prototype image motivated the changes. In this case, the prototype strength of the SUV subcategory mitigated the Hummer becoming the basis of a new subcategory of super vehicles.
9 Concluding remarks

In response to Wierzbicka’s assertion that “the notion of prototype has to prove its usefulness through semantic description, or through semantic theorizing” (1990:305), I have demonstrated that the notion of prototype does indeed illuminate the conceptual development of motor vehicle categories. First, I note that the early stage of the era of motorized road carriages was characterized by under-differentiation. Enterprising entrepreneurs experimented with the number of wheels required for a stable vehicle, with various configurations of engine-drive placement, and with differing seating arrangements for the driver and passengers. This under-determination was reflected in indecisive designations of road carriages as tricycles vs. tricars and quadricycles vs. quadcars.

Significant designs that contributed to the emergence of a prototype around the beginning of the twentieth century were first, Levassor’s placement of the engine at the front of the carriage with the clutch and gearbox located centrally underneath the body, and second, the body shape of the 1901 Mercedes with the driver and passengers in two rows of seats facing forward. In a short span of time, the wide variation in the design of motorized land carriages that characterized the nineteenth century was replaced with a firmly entrenched prototype of the automobile, one that has persisted to this day.

With regard to prototype theory, I make the modest suggestion of the concept of “prototype strength”—that there is strength in numbers and that the greater the similarity in shapes and identifiability of averaged shapes, the greater is the strength of a prototype. I suggest that the concept of prototype strength accounts for the “technological anarchy” that characterized the designs of motorized road carriages late in the nineteenth century and the technological sophistication that characterized the designs of SUVs in the 1960s.

I also suggest that the conformity of the shapes of the steam and electric-powered carriages, and of the three-wheelers, to that of the gasoline-powered carriages suggests that the prototype image of the latter served as the standard to which the former groups conformed. Finally, I suggest that this process of prototype imaging was confirmed by the history of the Jeep and the emergence...
of the SUV category, along with the redesigning of the Hummer to conform to the SUV prototype.

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