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The French Quest for the Silent Car Body

Technology, Comfort, and Distinction in the Interwar Period

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Abstract: Up until the First World War the open tourer had been the predominant car type in France. Then, during the 1920s, it was swiftly replaced by the closed sedan. The closed car revolution was accompanied by an intricate discourse on body noise and silence: motorists and journalists for example criticized noisy cars, test drivers praised the silence of certain car models, and automotive engineers investigated means to quieten car components with special consideration of the closed body. To unravel this multifaceted discourse the paper will describe the French quest for the silent car body and differentiate three different meanings of silence: mechanical silence, comfortable silence, and aristocratic silence. It will be argued that claims and judgments about automobile silence depended greatly on context and more general cultural connotations of noise and silence. The silent car body concomitantly symbolized engineering excellence, driving comfort, and social prestige.

Keywords

car sound, closed body, France, interwar period, noise abatement, silence

> "La vitesse est l'aristocratie du mouvement, mais le silence est l'aristocratie de la vitesse."[1]

The quick shift from open to closed cars during the 1920s was a decisive development in car technology and production methods.[2] The British writer Tom Rolt has called it "the most striking phenomenon in the history of the motor trade."[3] While in 1919 only 10 percent of the cars built in the United States were closed, production numbers of cars with closed bodies would surpass those of open tourers by 1925. Two years later more than 80 percent of cars built in the United States were closed.[4] With a little delay, a similar development occurred in Europe: from 1926 onwards the closed sedan became the preferred model in Great Britain, France, and Germany, and by the end of the decade it would dominate these national car markets. Although there are no exact figures available for the French automobile market, contemporary accounts emphasized that from the mid-1920s onwards the closed sedan became the standard type of car. In 1927, Citroën claimed in an advertising campaign that 50 percent of the cars it produced had a closed all-steel body, amounting to 38,000 cars.[5] For Germany, historian Heidrun Edelmann has indicated that by 1929 about 90 percent of the cars sold were closed, a share that amounted to a mere 10 percent only five years before.[6]

Contemporary commentators and historians of mobility have interpreted this dramatic transformation in car technology as an expression of a shift in car use patterns.[7] This shift is often described as the automobile's taming, so to speak, from an adventure machine into a utilitarian vehicle. Prior to the First World War, the petrol car had mainly served as a plaything for wealthy upper-class sportsmen: they used it primarily for touring and racing, the touring car or runabout with a folding top being the dominant body design. During the interwar years, however, the car would soon evolve into a basic means of transportation for members of the upper middle class. To allow for the new function of commuting and family

outings, the automobile needed to be reliable and easy to handle. Additionally, it had to provide better weather protection in all seasons: basic features of the permanently enclosed owner-driven sedan.[8] In 1927, a French journalist, commenting on the general shift towards the closed car, wrote: “Many automobilists drive all the time for their business affairs; they want to drive faster and faster, and they want to drive comfortably, protected against all weather conditions. The closed sedan provides all this, and we should expect even more closed cars to circulate on our roads if the slightly higher price would not be an obstacle for many customers.”[9] The closed version of a typical 1927 car was about 10 to 30 percent more expensive than the corresponding open model, the price difference being larger for small and medium-sized cars.[10] Despite this higher price tag, automobile journals reassured their readers that the closed sedan had become the standard.[11] Importantly, in this respect, other studies have shown that touring clubs and automobile journals played a crucial role as mediators in the co-construction process of the utilitarian vehicles by users and engineers.[12]

The closed car revolution was accompanied by an intricate discourse on body noise and silence. Although there seem to be remarkable parallels in the development of the closed body in the United States, France, Great Britain, and Germany,[13] the French context presents a special case for several reasons. The flexible closed fabric body, introduced by Charles Weymann[14] in 1921, offered a unique approach to quietening the body and had a lasting influence on the French development. Furthermore, the history of the French quest for the silent closed car is particularly well-documented: articles in engineering journals, advertisements by chassis and body manufacturers, editorials, driving tests, and readers’ letters in consumer magazines, and customer surveys all agreed that the ideal car was a “silent car.” The closed body played a crucial role in achieving silence, but, as will be shown below, it was at the same time the source of new noise problems.

Some examples may help to illustrate how, during the 1920s, silence featured in French car advertising. In 1922, the French sports car manufacturer Delage presented an

engraving of an open tourer speeding towards the viewer, a plain and empty scenery with a single line of trees serving as background (see Figure 1). The driver and his co-pilot in full leather gear and goggles nearly vanish in the schematized air turbulence caused by the speeding machine. Part of the car's front wheels fall just outside of the image's frame, as is true of a few tree leaves blowing in the car's wake, and this helps nicely to evoke its great speed and power. As the accompanying slogan succinctly puts it: "Fast and silent. It overtakes [all other cars]! It's a Delage."[15] The 1925 ad campaign of the Verdun-based coachbuilder Labourdette[16] coined the word "silensouple"—a neology composed of silent and supple—to illustrate the perfect silence inside his car bodies (see Figure 2). The label's large lettering with the two S's standing out as initials reminds the viewer of armchairs, with two men sitting on them as if sitting in the front and back of a car, while a blurred telegraph post in the background is meant to suggest they are driving fast. The man in front holds a finger at his ear as if attentively listening, while the other man bends backwards in a relaxed fashion, holding a burning cigarette in one hand while having the other hand in his pocket. The slogan reads "silence, comfort, and elegance."[17] Another advertisement from 1928 solemnly affirmed the reader that the new "valveless Peugeot is silent on the road like a swan on the lake."[18] The accompanying print shows an elegant, closed cabriolet in the bottom half and a white swan on a stylized lake in the upper left corner (see Figure 3).

These three examples demonstrate that *silence* was promoted in different ways and as having quite diverging meanings. The silence of the open sports car was not the silence of the "silensouple" body or the silence of the luxurious Peugeot. As such silence could refer to the stillness of the car and as experienced in the car, while silence was associated with imagery as different as the sportsman, the relaxed smoker, and the swan. This essay will describe the French quest for the silent car body and unravel three different meanings of silence: mechanical silence, comfortable silence, and aristocratic silence.[19] I will argue that claims and judgments about automobile silence depended greatly on context and more general cultural

connotations of noise and silence, and that they varied quite strongly even in the relatively short time span of the interwar period.[20]

While there is a rich literature on the French history of (auto)mobility,[21] the history of the closed body has been much less researched so far. Jean-Henri Labourdette wrote a popular account of the French car body, but it does not meet basic historiographic standards.[22] Roger White used the example of the American company Body by Fisher[23] for another popular account of the closed body story.[24] For the German case, Christian Binnbesel has described the shift of coach building from craft to industry. In the same line of argument, Paul Nieuwenhuis and Peter Wells have analyzed the implications of the all-steel body for automobile mass production.[25] Focusing on the introduction of the closed body in the United States, Gijs Mom has argued that it was "part of a general process of 'cocooning,' a redefinition of travelers' relation to the environment, a process in which the senses played a crucial role."[26] He has shown how American engineers integrated "comfort" as a primary design goal into the development of the permanently enclosed car. Finally, Karin Bijsterveld has analyzed the history of the car radio as an important device in the further process of acoustic cocooning.[27] In contrast to these previous efforts, the argument below will start from and concentrate on the interrelated history of silence and car body design in France.

Constructing the Closed Body

In the early 1920s, the typical French motorist would purchase an engine and chassis from one of the several car manufacturers and a separate body from a specialist coach builder. The body was made out of a wooden frame covered with wooden panels. Unlike the engine and chassis producers, body engineers represented an old established craft: "Body-engineering techniques for cars were literally carried forward from the days of the horse-drawn carriage."[28] Several of the body manufacturers represented a long tradition in coach building, going back to as early as the first half of the eighteenth century. However, soon after

the end of the First World War, engineers and automobile journalists started to criticize not only the traditional body construction methods, but also the practice of treating chassis and body as separate entities. They did so all the more because engine and chassis technologies were seen as much more advanced. This critique culminated in the verdict that "the structural concepts of the bodies mounted on our modern automobiles, even the most luxurious ones, should be conceived as true anachronisms."[29] Similarly, these critics disapproved of production methods, condemning skilled body engineers for using old-fashioned and impractical techniques.[30] At that time, auto body production was still very labor-intensive and time-consuming. In particular, painting the body would take several weeks, requiring successive "coats of lead-color, filler, stopper, stain, ground color, and body color, covered and protected by flatting and finishing varnishes."[31] The step-by-step transition from wood to metal and the introduction of quick-drying lacquer symbolized the emancipation of the body industry from its roots in the horse-drawn carriage era.

Two design principles competed with the traditional wooden bodies: composite constructions and the all-steel body. The standard composite body, already introduced in the early 1910s, consisted of an all-wooden frame that was covered with steel panels. Later, the wooden frame was reinforced with steel to give the body greater rigidity. This design was used by many body companies during the 1920s. Quite remarkably, the American company Body by Fisher, which delivered composite bodies for all General Motors brands, eliminated the last wooden parts as late as 1937: Until then, "the Fishers believed in the superior strength and quietness of wooden frames sheathed in steel."[32]

An alternative composite design was introduced by the French aviation pioneer Charles Weymann in 1921. Adopting methods from airplane construction, Weymann padded wooden frames with synthetic leather.[33] The body had a light ash framework, held together by steel plates instead of the mortise-and-tenon joints used by other coachbuilders. These techniques allowed Weymann to build flexible and very lightweight bodies: at 200 kilograms,

a four-seat closed sedan measured only half the weight of an ordinary torpedo.[34] As a contemporary observer noted, Weymann's bodies were "supple, workable, light and silent, and independent of the chassis."[35] To advertise his bodies, Weymann initially equipped them with a number of high-end European chassis, such as Voisin, Panhard, Hotchkiss, and Delage. In Weymann's own factory only small numbers of bodies could be built, but he sold licenses to many car manufacturers and coachbuilders. By the mid-1920s, Weymann had about 40 French licensees, including Renault, and roughly the same number in other European countries.[36]

In 1929, Weymann presented a new body construction at the automobile Salon in Paris: the semi-rigid body. Instead of fabric it was sheathed with steel plates like many other composite bodies. This change in the design principle sparked a debate in the trade journal *La Vie Automobile* on whether flexible or rigid constructions were more advantageous: while the flexible body was more silent, the (semi-)rigid body provided better safety in heavy car accidents.[37] Although prominent journalist Henri Petit[38] pleaded in favor of the flexible body in the manner of Weymann, the economic depression put an abrupt end to the discussion because Weymann's company met with financial trouble and was liquidated the following year.

Already during the 1910s, Edward Budd[39] and Josef Ledwinka[40] had made great progress in the development of an all-steel body, which after the war became a serious alternative to the standard composite constructions. Budd, who founded his own company in 1912, started to build steel-framed bodies for Dodge. These initially involved open tourers and, as of 1919, closed four-door steel bodies as well. If these designs were still in need of improvements and advances, especially in stamping and welding technology, the all-steel technology promised "less weight, greater styling possibilities, and mass production economies."[41] In 1924, French auto manufacturer André Citroën "pioneered all-steel body making on license from the American Budd company," which he credited "with helping him

accelerate his production from 30–50 cars per day to 400–500 in the 1920s."[42] Implementing the all-steel technology was also a matter of prestige for André Citroën, because he claimed to be the first French car manufacturer to use modern American production methods such as the assembly line, interchangeable parts and the all-steel body.[43] In 1927, the same Citroën ad proudly announced that 50 percent of the car company's daily production was equipped with an all-steel body, and that it was particularly silent and safe because "the resistance of its steel panels is a guarantee against the dangers of the road."[44]

Regardless of whether motorists preferred composite or all-steel bodies, they had to decide on buying the body either directly from the car manufacturer or from an independent coachbuilder. The latter used traditional production methods and each body was a unique piece of craftsmanship, allowing individual requests to be honored. In contrast, most car manufacturers applied mass production methods, and if their bodies lacked any personal touch whatsoever, they were offered at a lower price.[45] During the 1920s, the "trois grands" manufacturers in France—Citroën, Renault and Peugeot, which controlled about 75 percent of the domestic market in 1929—developed their own body production capabilities.[46] While in the early 1930s, Renault still built composite constructions, Citroën had already erected a new stamping factory in 1924, switching gradually to all-steel bodies.[47] Two years later, Peugeot followed Citroën's example with a steel body plant at its Sochaux site near Montbéliard.[48] As a result, these car manufacturers would produce ever more bodies on their own. As a result of this shift and accelerated by the economic depression that hit the French market in 1929, the number of independent coachbuilders diminished quickly. In 1928, twelve companies were still listed in the yearly overview of car manufacturers, coachbuilders and suppliers, but eight years later only two were left.[49] The last step, for the time being, was the introduction of the unit body design that integrated chassis and body into a single unit. This so-called "monopièce" technology, introduced in France by Citroën in 1932, abandoned the traditional separation between car manufacturers and coachbuilders "par construction."[50] A

contemporary observer noted that the introduction of the unit body marked a decisive turning point in car body evolution, because from then on automotive engineers would have to deal with chassis and body construction in equal measure.[51]

Mechanical Silence as a Symbol of Engineering Quality

I will now shift my argument to a discussion of the first meaning of automobile *silence* as outlined in the introduction: mechanical silence. Of course all car sounds conveyed potential information for drivers, indicating the status of the engine, whereby uncommon and loud noises commonly betrayed an urgent need for car repair or maintenance.[52] To promote the utilitarian vehicle to new customer groups during the interwar period, automobile engineers were eager to improve the reliability of motor cars: part of that development was the effort to reduce the noise of major mechanical components such as the gearbox or the drive train. Engineers and sales departments generally considered the new automobilists, unlike the early motor enthusiasts, as being unfamiliar with automobile technology. In this context, having more silent cars would reduce the number of misleading noises, which in turn would lower the number of inexperienced automobilists who got worried or were lured into incorrect technical diagnoses.[53] For similar reasons, engineers started to automate different tasks that early motorists had to handle manually, such as adjusting the timing or lubricating the engine.[54] Women especially were much courted by car manufacturers as prospective customers who would greatly appreciate easy-to-handle and reliable cars.[55]

A second strand of mechanical silence derived from the discourse on noise as a sign of wear and tear and a loss of power. Medical historian Allard Dembe has shown that around 1900 engineers began to reduce noise from production equipment because they realized that "noisy machinery" could be "an indication of mechanical inefficiency that ultimately can result in lower productivity and increased cost."[56] These ideas were taken up by automotive engineers. Charles Faroux,[57] editor-in-chief of *La Vie Automobile*, defined silence as the

symbol of mechanical quality, writing: “Silence is for sure amongst the finest qualities of automobiles. Mechanical noise always represents a loss of energy.”[58] Accordingly, engineers directed their research towards vibration and noise reduction of automobile components.

Not surprisingly, perhaps, the engine served as a primary target of investigation. Different measures to reduce engine noise were discussed frequently, such as the replacement of gearwheels by chains for the connection between camshaft and crankshaft,[59] or the replacement of metal gearwheels by “silent gearwheels” made of reinforced synthetic resin.[60] A more general problem was the balancing of the rotating structures of the internal combustion engine. Here, small four-cylinder engines seemed to have a natural disadvantage compared to oversized six- and eight-cylinder engines. The latter “combine[d] a good torque at low speed with smoothness, silence and flexibility.”[61] They also allowed the driver to stay in direct gear most of the time—the only silent gear, whereas all indirect gears produced loud “tram-like” noises.[62] Overall, gears were “the noisiest component, beside the engine.”[63] To reduce the need for gear shifting, engines from three to four liter were preferred,[64] even though driving slowly with half-closed throttle caused higher fuel consumption.[65] Still, the French automobile taxation regime on the basis of cylinder capacity favored small high-revving engines.[66] In 1923, 55 percent of the cars made had ten fiscal horsepower or less, rising to 80 percent five years later.[67] This is why engineers searched for other means to control engine vibrations. A promising approach was introduced by Chrysler in 1931: the “floating point” technology. This two-point engine mounting system utilized flexible rubber mounts to keep vibrations from the engine from reaching the frame and body. In marketing its four-cylinder Plymouth, Chrysler’s slogan claimed to offer the “smoothness of an eight with the economy of a four.”[68] Recognizing the potential of the new system, Citroën invested 250,000 dollars to acquire a license from Chrysler. Already by October 1931, the new C6G was introduced as the first model equipped with a “motteur flottant.”[69] As with the Peugeot ad

from 1928, Citroën used the image of a floating swan, in this instance for promoting the mechanical silence achieved by the *floating point* technology.

[insert figure 1 here]

Figure 1. "Fast and silent. It overtakes! It's a Delage." Advertisement for a Delage touring car, 1922.[70]

As reflected by the abovementioned Delage advertisement, open cars were promoted as mechanically silent as well. In contrast, closed cars were, at first, depicted as lacking mechanical silence. In 1925, an unnamed author complained that closed bodies often caused such objectionable noises that open cars still had to be preferred.[71] One explanation is that the enclosed space focused the driver's attention, making sounds audible that could hardly be noticed when driving in an open tourer. To achieve mechanical silence coachbuilders followed different approaches, also depending on the construction type of the body.

For composite bodies typical squeaks and rattles had to be eliminated. French coachbuilders like Paul Audineau applied rubber and artificial leather bumpers between body and chassis, to prevent the transmission of vibrations between them, and between the wooden frame and the sheet metal panels. To prove that closed bodies were "better than a torpedo," Audineau advertisements used engineering drawings to highlight the multiple places where special measures were taken to quieten the body.[72] With respect to the flexible Weymann body, Tom Rolt remembered that while "the genuine Weymann body was handsome, durable and relatively rattle-free, its cheap imitators proved quite the reverse and brought the fabric body into disrepute."[73] However, the fabric body was finally abandoned for safety reasons. Subsequently, composite bodies with wooden frames and sheeted steel-plates became popular, even though contemporary commentators agreed that these lacked the original Weymann silence: "We have to state that almost all bodies are noisy when sold."[74] They

added that today's steel and wood-steel bodies cannot be silent "par construction."[75] If Renault, just like Body by Fisher, in fact tried to convince its customers that composite bodies sheathed with steel panels were the only silent construction,[76] Citroën emphasized that "as a result of the absence of any joints the closed all-steel body is particularly silent."[77] The steel body had to cope with other noise issues, however. The large steel panels transformed the body into a veritable boom box that amplified vibrations from chassis and drive train. As one engineer put it, the steel body itself was not noisy but very resounding. The application of special varnishes could reduce the amplifying effect, but in this particular technological field French manufacturers lagged behind their American counterparts.[78]

A common problem engineers encountered in their quest for the silent car (body) was that quietening one noise source often revealed others. In his article "Towards the Greatest Silence," René Charles-Faroux[79] claimed that "the adoption of the six-cylinder engine in our modern automobiles resulted, at first, in giving these cars a greater elasticity, and, at the same time, making them more silent." Yet, so he continued, "at the same time, when the engine noise completely disappeared, or became less audible, vibrations caused by other components came into the foreground."[80] In the same manner, quietening the body revealed other noise sources. Charles Brull, former head of the Citroën research laboratories, explained: "It is not long ago that the free concert of the body successfully masked the noise caused by a poorly balanced high-revving engine. Cynical colleagues say that for the same reason they cannot wait for the widespread use of car radios."[81] A more appropriate solution than tuning in the radio was found in the ubiquitous application of flexible materials like rubber or cotton-reinforced Bakelite.[82] The latter was used to build silent gear wheels, and sold under brand names like Textolit or Celoron. The accompanying advertisements reminded drivers that "inside your engine, silence is golden."[83] Rubber was utilized to avoid direct metal to metal contacts. In France, the company Silentbloc offered rubber applications for engine mountings, springs, brakes, gear boxes, or body frames. The 1926 campaign announced that the next

automobile salon would be the “Salon of Silence” resulting from the widespread use of Silentbloc.[84]

In many instances, however, mechanical silence meant the reduction of particular sounds only, rather than the overall silencing of automobile components. This explains why research in this field continued, or even intensified, throughout the 1930s.[85] Engineers applied new tools, such as acoustic test stands,[86] and in the regular sessions of the French Society of Automobile Engineers (SIA), founded in 1927, noise issues were discussed frequently. The introduction of objective acoustic measuring devices, which substituted the subjective *ear* of the engineer, was seen as crucial. In 1932, acoustic engineer Marc Chauvierre stated that “if you want to study a certain phenomenon, you first have to be able to measure it.”[87] In the following years, other speakers presented the latest electro-acoustical findings and the use of acoustic instruments in automotive research.[88] In 1935, Citroën offered a technique that measured for the first time interior body noise in decibels. Unfortunately, the results were not given in absolute numbers. As Charles Brull explained, only the increase of interior noise was measured. In one case study he presented, interior noise increased by 20 decibels during the acceleration from 30 to 100 kilometers per hour,[89] while better sound insulation of the body’s roof and floor produced an increase of only 15 decibels.[90] Although it is safe to conclude from the different contributions to the *Journal de la SIA* that French manufacturers tried to systematize the research and development of silent car components, it is difficult to evaluate the impact of these efforts as well as the role of acoustic experts in the actual design process. Compared to the concomitant developments in the United States, acoustic research in French automotive engineering was still in its infancy.[91]

Mechanical silence nevertheless played an important role in French automotive technology development during the interwar period. It became a sign of engineering excellence, as many accounts in the regular test drive column of *La Vie Automobile* demonstrate. Journalists were given test cars from the manufacturers to carry out longer test

drives, ranging from a few hundred kilometers up to 2,000 kilometers. In their accounts they gave very detailed information about their itinerary, including road conditions, road surfaces, ongoing construction work, and the length and steepness of climbs. Test reports were accompanied by tables and graphs indicating the average speed on single sections and the overall travel. The overall average speed was often between 60 and 70 kilometers per hour, reaching up to 90 kilometers per hour on good road sections. The authors of these reports partly relied on their audible experience during the test drives to judge the overall engineering quality of different components such as gear boxes, brakes, chassis, and bodies.[92]

Long-range Travel and the Need for Comfortable Silence

The increased reliability of automobile technology enabled motorists to travel greater distances without having to fear mechanical troubles. This sustained the emergence of a new form of tourism, long-range tourism,[93] which simultaneously increased the relevance of comfortable silence. One author articulated this concern rather eloquently: "After a journey of five or six hours in a noisy car you are literally anaesthetized; your ears are buzzing, your thinking is annihilated."[94] At first sight, it may seem contradictory that Henri Petit, in his essay "Closed Sedan or Torpedo," celebrated the torpedo in the context of tourism ("For tourism, long live the torpedo!").[95] He made a clear distinction, however, between tourism and travel. In his view, tourism referred only to shorter trips aimed at enjoying the beauty of the scenery in good weather conditions, while travel rather involved functional mobility, driving in a straight line from A to B, and for this purpose the closed sedan had to be preferred. He explained that "the closed body protects against the well known noise caused by the whistling of the airflow, above all at full speed. … In addition, a perfectly silent body—which is possible of course—also muffles most noise of the chassis because it is closed."[96]

The kind of silence Petit referred to in this particular quote differs from the mechanical silence discussed in the previous section. It was not the silence of a body that produced no

creaking and squeaking that he sought to identify. He had in mind rather the silence created in a space that insulated those inside it from outside noise—a body that protected against road and wind noise. In another article, Petit emphasized this insulating effect when he wrote that a silent body would indeed muffle body and chassis noises on bad roads.[97] This also becomes clear from another statement praising the silence of the Weymann body: "the main quality of the Weymann body is the comfort it offers to the occupants. This comfort is caused by its tight silence. And silence is the quality we are longing for, especially in an automobile, and even more when the automobile is used for long-distance travel. … Because the occupants are completely insulated from the chassis through the floor panel, and three layers of fabric, one of them a thick layer of felt, they can hardly hear any exterior noise."[98] This insulation or shielding from exterior noise also prevented the occupants from fatigue, because "the fatigue of passengers after a long journey in a closed car is caused by the constant noise that penetrates their ears. In a Weymann this noise is perfectly muffled."[99] The lack of fatigue thus became an indicator of automobile comfort. American engineers embraced this concept of comfort as absence of fatigue and conducted extensive test series with "vibrating chairs" and "shake tables," deploying the human body as a seismograph for automobile comfort.[100]

Just like the concern for mechanical silence, the absence of fatigue after a long trip became a category for judging the qualities of a car. In 1923, one test driver had the opportunity to drive a car with the same chassis with both a torpedo and a closed body. In his report, he explained to the readers that while the chassis had been identical the closed body had the big advantage because of its comfortable silence, its not causing any fatigue.[101] Another test driver wrote about his experience with a closed sedan: "when I arrived I was as fresh as at the start, without the slightest buzzing in my ears, just like I stepped out of a well cushioned living room, instead of an automobile."[102] The metaphor of the closed car as "living room on wheels" referred to other aspects of automobile comfort as well, such as

insulation against odor and draft, soft upholstery, fine fabrics and the accessibility of the rear seats.[103]

A desire for comfort, however, was not only found among test drivers and engineers. In 1922, the journal *La Vie Automobile* asked its readers to vote for ten qualities that determined their choice of an automobile. The 2,247 respondents mentioned "endurance" and "economy of operation" most often, to be followed by "comfort" and subsequently by "hill climbing capability" and "price," while "speed" came in last.[104] Remarkably, an American survey of the same year revealed comparable preferences.[105] It is hardly surprising, therefore, that French car and body manufacturers made use of the motorists' priority list and highlighted comfort and comfortable silence in their marketing campaigns. Taken together, the automobilists' wish list, the efforts of engineers aimed at silencing cars and the accompanying marketing campaigns nicely underscore the co-construction process of automobile technology during the interwar years.

[insert figure 2 here]

Figure 2. "The Silensouple. Silent. Comfortable. Elegant." Advertisement of body manufacturer Henri-Labourdette, 1925.[106]

Henri Labourdette's abovementioned advertisement named silence, comfort, and elegance as the main qualities of a car body. In addition, a Renault advertisement from 1926 promised that comfortable silence was within reach for low-priced and mid-priced cars as well. The Renault ad characterized the 6 and 10 CV models as perfect for travel: "To find true automobile comfort you need a flexible closed sedan, its mass-produced body dampening all vibrations without noise or resonance, and its silence eliminating fatigue."[107] In a similar way, Voisin reminded prospective customers of the importance of comfortable silence, because "among all sensations the human organism has to endure, noise is the most oppressive."[108]

Women were expected to be more sensitive to automobile comfort than the male clientele,[109] and French manufacturers specifically addressed feminine automobilists in their ads by emphasizing the comfort of their latest models.[110] These examples demonstrate that, aside from mechanical silence, the silence of the closed body became a central marketing tool during the 1920s. Ironically, comfortable silence, as shielding from exterior noise, eased the physiological effects of noise, caused by the preeminent source of noise in those days: the automobile.[111]

Aristocratic Silence as a Mark of Distinction

It seems that silence was a rather recent virtue in automobile culture. Before the First World War, cars had to be noisy. In 1929, H.-G. Laignier, vice-president of the French car agents association, remembered that some twenty years ago "automobiles had to drive as fast as possible and they had to make a lot of noise. When you drove through a village you deliberately opened the exhaust. Today, preferences have changed: we want to hear a faint whisper, like the rustling of silk."[112] Although Laignier's observation was only true for sports cars, it revealed an older symbolism of noise as a sign of power: those higher in the social-cultural hierarchy were allowed to make more noise than those lower in that hierarchy. For Karin Bijsterveld "such a symbolism co-constitutes 'the cultural meaning of sound'."[113] In the case of early automobilism, it was a "freedom" of upper-class motorists to terrorize villagers with their noisy machines.[114] However, silence could also be a sign of power, implying control over auditory space: those lower in rank had to be silent in the presence of the higher ranked. In addition, from the sixteenth century onwards, controlling one's voice was increasingly seen as a sign of self-control. Historian Peter Burke has shown that the ability to keep a prudent silence became a bourgeois mark of distinction and civilized refinement.[115] Early automobilism also incorporated this symbolism of silence, as reflected by representative limousines and electrical vehicles.[116]

Before the 1920s, the closed sedan had been reserved for luxury models, its mechanical and comfortable silence being a privilege of upper-class motorists that expressed social hierarchies: "The luxury classics, because of superior engineering and careful hand-fitting, were mechanically tighter and drove more smoothly. Their engines ran quietly, their transmissions shifted effortlessly and their brakes functioned at a touch, creating a refined, relaxed driving experience befitting the ostentatious ease characteristic of the upper-class habitus."[117] Rolls-Royce was the archetype here, and its matching advertising slogan assured that this car was "as silent as its shadow."[118] This superior silence was also confirmed by motor journalists: in 1923, Henri Petit praised the mechanical and comfortable silence of the new 20 HP Rolls-Royce: "At high speed (over 80 km/h) [it] is like other excellent cars we know. But if you do not exceed 70 km/h, you move like you are padded in cotton wool, or, as one can say: without the faintest noise, without the slightest vibration."[119] Other manufacturers of the luxury segment also stressed the silence of their cars. Alfa Romeo promised in 1922 that its new six-cylinder landaulet was "flexible, powerful, silent." Alfa Romeo's sales department assumed that the upper middle classes also longed for these attributes: "The dream of any motorist is to have a dream car."[120] Another example here is Charles Weymann, who assured potential customers that "the silence of the Weymann body satisfies the most delicate ear," and he presented this slogan with the drawing of an oversized ear behind a luxurious four-door sedan.[121] Delicate, fine-tuned hearing was thus seen as a sign of civilized refinement. The widespread introduction of closed sedans in the low- and middle-price ranges seemed to make Alfa Romeo's "dream" come true. In 1926, one journalist announced the "Death of the Torpedo,"[122] and one year later the journal of the French Automobile Club claimed that automobilists had to buy closed cars to follow the fashion.[123] Manufacturers like Renault, Citroën or Mathis produced sedans for members of the middle class, and to sell their cars they adopted the advertising strategies used by luxury brands, in particular because they expected customers to be willing to pay a bit more for silence when it

was labeled as the "royal luxury of silence."[124] The advertisements indeed suggest that from the 1920s onwards, quietness became a sign not only of engineering quality but also of the car owner's good sense of taste. By stressing this meaning of quietness, car manufacturers both used and expressed the cultural connotation of silence with standing and distinction.[125] The connotation of silence with social standing was also expressed by the emblematic animals chosen to symbolize aristocratic silence: the white swan (Renault and Citroën) and the leopard (Brampton and Lincoln).[126] In the United States, car manufacturers used symbols to a similar end. The iconic label of Body by Fisher, for example, was a Napoleonic coach.[127] These labels promised middle-class motorists that by buying a closed sedan they would also gain aristocratic silence as a status symbol.

[insert figure 3 here]

Figure 3. "The valveless Peugeot, silent … on the road like a swan on the lake." Peugeot advertisement, 1928.[128]

The success of the closed body coincided with a change in American advertising: rather than putting "emphasis on the reliability and performance of the car's mechanical elements," manufacturers began to highlight "the pleasure and psychological benefits of driving it."[129] As indicated above, French manufacturers would adopt this theme as well. The SIA, for example, invited H.-G. Laignier to inform automobile engineers of the latest marketing strategies. In his lecture he explained the role of fashion for future automobile development, arguing that "we have to consider the automobile as an object that grows obsolete rapidly."[130] As a result of annual changes in styling or accessories, new cars were supposed to go out of fashion in two or three years.[131] The task of marketing campaigns was to stimulate this fashion cycle, Laignier continued, to "arouse the desires of the customer," and in so doing "exploit all human emotions."[132] To him, the vanity of motorists was the true

sales engine: “The submission to fashion, in the field of trade, nourishes the need of the elites to distinguish themselves from the masses, and the need of the masses to copy the elites.”[133] Thus middle-class motorists were conceived as eager to improve their social standing in appropriating the rules of elitist automobile culture. Manufacturers addressed women as particularly sensitive to fashionable distinctions. In one of its ads Renault explained “why the French woman, for whom fine taste is a golden rule, should purchase a Renault”: it was the elegance, the comfort, and the adoption of “ultra-modern” technological solutions that made all Renaults stand apart.[134] The French car company Berliet courted the “elegant lady” who would choose a car for its well-known silence, power, and perfect body styling.[135] The marketing departments believed that women viewed the automobile as a fashion object and a status symbol in the same measure, and they anticipated that the purchasing power of female automobilists was certainly going to push the French automobile market in the future.[136]

On the other hand, middle-class cars did not achieve the promised quietness. In particular, the mass-produced all-steel bodies caused serious noise problems as Charles Brull had to admit in 1935.[137] If aristocratic silence was indeed desired by middle-class automobilists, it actually remained a privilege of the wealthy: Panhard’s expensive new six- and eight-cylinder models used “tomorrow’s technology,” granting class “distinction” to upper-class motorists.[138] By the end of the 1930s, Talbot would still advertise silence as *the* preeminent trademark of luxury cars.[139]

Conclusion

During the interwar period, the owner-driven sedan with a closed body became the “natural” form of the civilized automobile. Altered driving patterns, engineering discourses and cultural meanings of noise and silence all contributed to the construction of the silent body as the ideal body type. In this process different meanings of mechanical, comfortable and aristocratic silence complemented each other. The silent car body concomitantly symbolized engineering

excellence, comfort and social prestige. A quieter car body was frequently discussed by French engineers and journalists, but also demanded by consumers and test drivers, and car and body manufacturers addressed all three meanings in their advertisements.

Around 1927, French commentators were confident that engineers and designers had made significant progress in their quest for the silent body, in terms of both mechanical and comfortable silence. In particular, the flexible construction in the manner of Weymann was hailed as a great achievement. Changes in body construction and production technologies also gave rise to new noise problems, however. In 1934, American engineers admitted that measurements had proven that Weymann's original fabric body was quieter than wood-steel and steel bodies using Fisher or Budd constructions.[140] The new composite and all-steel bodies were less silent, which called for the ongoing pursuit of the silent car body.[141]

It should be pointed out, however, that changes in technology did not alone account for the prolonged pursuit of the silent body. For one thing, automobile silence was conceptualized as absence of certain sounds, rather than as an absolute reduction of noise. Moreover, concerns about particular sounds also changed over time. For example, while having a silent direct gear seemed sufficient in the 1920s, all gears had to be silent in the next decade. It is evident, furthermore, that manufacturers overstated the silence of cars and bodies in their advertising campaigns: the promised "absolute silence" was not exactly silent in terms of decibels.[142] American measurements revealed that interior noise was as high as 82 decibels, which implied that in terms of decibels the interior of middle-class sedans was *not* quiet at all.[143] In 1938, Joseph Bethenod, vice-president of the SIA, published a sharp critique of the exaggerated claims of car manufacturers. He lamented that "each year at the Salon we hear the eternal refrain: the engines run faster, have a higher compression, the gears are more silent, etc., etc."[144] Yet, the cars actually produced were far from achieving all these goals. It is safe to conclude, then, that car manufacturers did not live up to their promise of producing a genuinely silent automobile in the low and middle price range, while aristocratic silence

would continue to be a feature of automobiles only available to the happy few—which in fact is true to this day. At the same time, the notion of the enclosed sedan that could be sonically designed in such a way that it would become a quiet and relaxing capsule for its driver and passengers had a lasting impact on automobile culture.[145]

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Notes

[1] "Speed is the aristocracy of movement, but silence is the aristocracy of speed." Maurice Goudard (President of the Société des Ingénieurs de l'Automobile) cited by H.-S. Kagan, "Les méthodes de mesure de bruit et leur application dans la construction automobile," *Journal de la SIA* 11, no. 1 (1937): 14. All translations of quotes from French into English have been made by the author.

[2] L.T.C. Rolt, *Motoring History* (London: Studio Vista, 1964), 117; Paul Nieuwenhuis and Peter Wells, "The All-steel Body as a Cornerstone to the Foundations of the Mass Production Car Industry," *Industrial and Corporate Change* 16, no. 2 (2007): 183–211.

[3] L.T.C. Rolt, *Horseless Carriage: The Motor-car in England* (London: Constable, 1950), 113.

[4] James J. Flink, *The Automobile Age* (Cambridge and London: The MIT Press, 1988), 213–214.

[5] Advertisement Citroën, *La Vie Automobile* September 25, 1927, i; for French car production figures see Jean-Louis Loubet, *Histoire de l'Automobile Française* (Paris: Éditions du Seuil, 2001), 114, 136, 138; for Great Britain see Rolt, *Horseless Carriage*, 113.

[6] Heidrun Edelmann, *Vom Luxusgut zum Gebrauchsgegenstand: Die Geschichte der Verbreitung von Personenkraftwagen in Deutschland* (Frankfurt a.M.: VDA, 1989), 98.

[7] For contemporary comments see Henri Petit, "La voiture utilitaire," *La Vie Automobile* 18 (1922): 323–325; R. B. [only initials], "Neue Wege im Karosseriebau," *Auto-Technik* 13, no. 4 (1924): 20. For historiographical accounts see James J. Flink, "The Ultimate Status Symbol: The Custom Coachbuilt Car in the Interwar Period," in *The Car and the City*, ed. Martin Wachs and Margaret Crawford (Ann Arbor: The University of Michigan Press, 1992): 154–166; Rudy Koshar, "Germans on the Wheel: Cars and Leisure Travel in Interwar Germany," in *Histories of Leisure*, ed. Rudy Koshar (Oxford and New York: Berg, 2002): 215–230; Gijs Mom, Johan Schot and Peter Staal, "Civilizing Motorized Adventure: Automotive Technology, User Culture, and the Dutch Touring Club as Mediator," in *Manufacturing Technology: Manufacturing Consumers. The Making of Dutch Consumer Society*, ed. Adri de la Bruhèze and Ruth Oldenziel (Amsterdam: Aksant, 2008): 141–160.

[8] Roger B. White, "Body by Fisher: The Closed Car Revolution," *Automobile Quarterly* 29 (1991): 46–63; ibid., "Fisher Body Corporation," in *The Automobile Industry, 1896–1920*, ed. George May (New York: Facts on File, 1990): 187–192.

[9] J.-R. Lambert, "Une opinion sur l'automobile d'avenir," *La Technique Automobile et Aérienne* 18 (1927): 56.

[10] Peugeot's cheapest 5 CH model sold at 16,980 Francs for the torpedo and 21,980 Francs for the closed sedan; the closed version of Renault's luxurious Vivasix sold at 44,000 Francs, while the torpedo was 4,000 Francs cheaper. Advertisement Peugeot, *Bulletin Officiel de l'Automobile-club de France (hereafter: ACF)* 5, no. 2 (1927): vii; Advertisement Renault, *La Technique Automobile et Aérienne* 18 (1927): iii.

[11] For example Charles Faroux, "La mort du torpedo," *La Vie Automobile* 22 (1926): 25.

[12] Mom, Staal and Schot, "Civilizing Motorized Adventure"; Gijs Mom, "Civilized Adventure as a Remedy for Nervous Times: Early Automobilism and Fin-de-siècle Culture," *History of Technology* 23 (2001): 157–191.

[13] For the U.S., Great Britain, and Germany, see Gijs Mom, "Orchestrating Car Technology: Noise, Comfort, and the Construction of the American Closed Automobile, 1917–1940," (forthcoming); Rolt, *Horseless Carriage*; ibid., *Motoring History*; Karin Bijsterveld and Stefan Krebs, "Listening to the Past: The Car as Sounding Object," in *Sonic Interaction Design: Fresh Perspectives on Interactive Sound*, ed. Karmen Franinovic and Stefania Serafin (Cambridge, MA: MIT Press, forthcoming).

[14] Charles Weymann (1889–1976) was an early airplane racing pilot and businessman. After the First World War, Charles Weymann used his knowledge of airframe design to develop a system of making fabric bodies for road vehicles. He opened factories in Paris in 1921, in London in 1923, and in Indianapolis in 1928. The French branch closed its doors in 1930. For a contemporary portrait with photographs, see Anonymous, "Flight Pioneers," *Flight* 3 (1911): 583–589.

[15] Advertisement Delage, *La Vie Automobile*, September 25, 1922, xx.

[16] Jean-Henri Labourdette (1888–1972) was a well-known French body manufacturer. He started his career in the family business in 1910. The Paris-based factory closed its doors in 1939. Jean-Henri Labourdette, *Un Siècle de carosserie francaise* (Lausanne: Edita, 1972).

[17] Advertisement Labourdette, *ACF* 3, no. 6 (1925): no page number.

[18] Advertisement Peugeot, *La Vie Automobile*, November 10, 1928, xxx.

[19] The research for this paper was funded by the Dutch Science Council NWO in the context of "Selling Sound: The Standardization of Sound in the European Car Industry and the Hidden Integration of Europe," a project acquired by Karin Bijsterveld (Maastricht University) and Gijs Mom (TU Eindhoven), in cooperation with this author and Eefje Cleophas. I would like to thank my colleagues and four anonymous referees for their constructive feedback.

[20] For different shifts in the cultural connotations of automobile sounds, see Karin Bijsterveld, *Mechanical Sound: Technology, Culture and Public Problems of Noise in the Twentieth Century* (Cambridge, MA: MIT Press, 2008); Bijsterveld and Krebs, "Listening to the Past."

[21] For an overview see Patrick Fridenson, *Histoire des usines Renault* (Paris: Èdition du Seuil, 1972); Pierre Dumont, *Quai Javel: Quai André Citroën* (Paris: EPA, 1973); Jean-Louis Loubet, *Les Automobiles Peugeot* (Paris: Economica, 1990); Loubet, *Histoire de l'Automobile Française*; Christoph Maria Merki, *Der holprige Siegeszug des Automobils 1895–1930: Zur Motorisierung des Straßenverkehrs in Frankreich, Deutschland und der Schweiz* (Wien: Böhlau, 2002); James M. Laux, *The European Automobile Industry* (New York: Twayne Publishers, 1992), Jean-Pierre Bardou et al., *The Automobile Revolution: The Impact of an Industry* (Chapel Hill: University of North Carolina Press, 1982).

[22] Jean-Henri Labourdette, *Un Siècle de carosserie francaise.*

[23] The Fisher Body company was founded in 1908. In 1926 it became an operating division of General Motors. For a company portrait see White, "Body by Fisher."

[24] White, "Body by Fisher."

[25] Christian Binnebesel, *Vom Handwerk zur Industrie: Der PKW-Karosseriebau in Deutschland bis 1939* (Berlin: Ph.D. thesis, TU Berlin, 2007); Nieuwenhuis and Wells, "The All-steel Body."

[26] Mom, "Orchestrating Car Technology;" ibid., "The Future is a Shifting Panorama: The Role of Expectations in the History of Mobility," in *Zukünfte des Automobils: Aussichten und Grenzen der autotechnischen Globalisierung*, ed. Weert Canzler and Gert Schmidt (Berlin: Sigma, 2008), 31–58.

[27] Karin Bijsterveld, "Acoustic Cocooning: How the Car Became a Place to Unwind," *The Senses & Society* 5, no. 2 (2010): 189–211; Eefje Cleophas and Karin Bijsterveld, "Selling Sound: Testing, Designing and Marketing Sound in the European Car Industry," in *The Oxford Handbook of Sound Studies (New Directions Series)*, ed. Trevor Pinch and Karin Bijsterveld (Oxford: Oxford University Press, forthcoming).

[28] Karl E. Ludvigsen, "A Century of Automobile Body Evolution," *Automotive Engineering* 103 (1995): 51–59.

[29] Henri Petit, "La carrosserie Weymann," *La Vie Automobile* 18 (1922): 155–158.

[30] Anonymous, "La carrosserie de la Société des Moteurs Salmson," *La Vie Automobile* 17 (1921): xc.

[31] Ludvigsen, "A Century of Automobile Body Evolution," 53.

[32] White, "Body by Fisher," 63.

[33] For the development of airplane constructions, see Eric Schatzberg, *Wings of Wood, Wings of Metal. Culture and Technical Choice in American Airplane Materials, 1914–1945* (Princeton: Princeton University Press, 1999).

[34] Petit, "La carrosserie Weymann," 157.

[35] Anonymous, "Les carrosseries Weymann," *La Vie Automobile* 21 (1925): 539.

[36] Advertisement Weymann, *La Vie Automobile* February 25, 1926, xxiii.

[37] Henri Petit, "Carrosserie souple ou rigide?," *La Vie Automobile* 25 (1929): 238–240; René Charles-Faroux, "L'Évolution de la Carrosserie moderne," *La Vie Automobile* 25 (1929): 350–355.

[38] Engineer Henri Petit (b. 1878) was a regular contributor to *La Vie Automobile* and *La Technique Automobile et Aérienne*. Anonymous, "Nos Collaborateurs," *La Vie Automobile* 22 (1926): 345.

[39] Edward G. Budd (1870–1946) was an American inventor and businessman. In 1912 he founded the Budd Company, which specialized in the manufacture of pressed-steel frames for automobiles. Budd soon became one of the biggest American body manufacturers. Together with Josef Ledvinka he pioneered the use of arc welding in automobile manufacturing. Stan Grayson, "The All-steel World of Edward Budd," *Automobile Quarterly* 16, no. 4 (1978): 351–367.

[40] Josef Ledvinka worked for the Joseph Keller Mechanical Engineering Corporation, leading manufacturer of heavy stamping presses, before he became associate of Edward Budd when the latter established his company in 1912. Ledvinka held the position of general manager and supervised the production of all-steel bodies; together with Budd he pioneered the use of arc welding in automobile body production. Michael Mende, "For a Long Time an Obstacle to an Integrated Automobile Manufacture: The Problem of High Volume Body Construction," unpublished manuscript.

[41] William J. Abernathy cited by Flink, *The Automobile Age*, 213.

[42] Ludvigsen, "A Century of Automobile Body Evolution," 54.

[43] By 1924 the Citroën factory at Quai Javel had a mechanically operated assembly line. Laux, *The European Automobile Industry*, 77.

[44] Advertisement Citroën, *La Vie Automobile* September, 25, 1927, i.

[45] Charles-Faroux, "L'Évolution de la Carrosserie moderne;" René Charles-Faroux, "Commodités d'usage," *La Vie Automobile* 28 (1932): 97–99.

[46] Shortly after the war, the "trois grands" only controlled one third of the annual car production. See Loubet, *Histoire de l'Automobile*, 114.

[47] Laux, *The European Automobile Industry*, 77.

[48] Ibid., 80.

[49] Principaux Fournisseurs de l'Automobile, *La Vie Automobile* 24 (1928): no page number; Principaux Fournisseurs de l'Automobile, *La Vie Automobile* 32 (1936): 495–496. At the same time, the number of car manufacturers dropped from 90 to 20. Bardou et al., *The Automobile Revolution*, 141.

[50] Loubet, *Histoire de l'Automobile*, 105.

[51] Pierre Maillard, "L'Évolution des Carrosseries," *La Vie Automobile* 31 (1935): 373–383.

[52] For a case study on German motorists, see Stefan Krebs, "'Sobbing, Whining, Rumbling'—Listening to Automobiles as Social Practice," in *The Oxford Handbook of Sound Studies (New Directions Series)*, ed. Trevor Pinch and Karin Bijsterveld (Oxford: Oxford University Press, forthcoming); for contemporary French accounts see Anonymous, "Les Pannes," *La Vie Automobile* 16 (1920): 317–318, 458; Anonymous, "Cours élémentaire d'Automobile," Supplement of *La Vie Automobile* (1924).

[53] Henri Petit, "Les fausses pannes," *La Vie Automobile* 31 (1935): 317–320.

[54] Henri Petit, "L'Automatisme en Automobile," *La Vie Automobile* 17 (1921): 317–319; see also the special issue on automation *La Vie Automobile*, April 25, 1935.

[55] On the role of female drivers see Virginia Scharff, *Taking the Wheel: Women and the Coming of the Motor Age* (New York: Free Press, 1991). For contemporary French advertisements, see for example Advertisement Berliet, *La Vie Automobile*, January 10, 1926, xix; Advertisement Repusseau, *La Vie Automobile*, February 10, 1926, xvii.

[56] Allard Dembe, *Occupation and Disease: How Social Factors Affect the Conception of Work-related Disorders* (New Haven and London: Yale University Press, 1996), 195; see also Karin Bijsterveld, "Listening to Machines: Industrial Noise, Hearing Loss and the Cultural Meaning of Sound," *Interdisciplinary Science Reviews* 31, no. 4 (2006): 328.

[57] Charles Faroux (1873–1957) was the doyen of French automobile journalists. In 1923, together with Georges Durand und Emile Coquille he founded the famous 24 Hours of Le Mans. Anonymous, "Nos Collaborateurs," 345.

[58] Charles Faroux, "Le Silence," *La Vie Automobile* 29 (1933): 169.

[59] Henri Petit, "Équilibrage et vibrations," *La Vie Automobile* 24 (1928): 309–311, 323–325.

[60] I. D. N., "Les engrenages silencieux de distribution," *Journal de la SIA* 4, no. 4 (1930): 991–996.

[61] Rolt, *Horseless Carriage*, 97.

[62] Ibid., 101.

[63] Petit, "Équilibrage et vibrations," 325.

[64] René Charles-Faroux, "Vers le plus grand silence: Le problème de la transmission," *La Vie Automobile* 25 (1929): 577.

[65] Mom, "Orchestrating Car Technology."

[66] Historian James Laux argues that European manufacturers lobbied for this taxation system to discriminate cars with large engines, that is, those from American competitors. Laux, *European Automobile Industry*, 73, 76.

[67] Bardou et al., *The Automobile Revolution*, 102.

[68] H. Eugene Weiss, *Chrysler, Ford, Durant and Sloan: Founding Giants of the American Automotive Industry* (Jefferson, NC: McFarland, 2003), 145.

[69] Loubet, *Histoire de l'Automobile*, 105.

[70] Advertisement Delage, *La Vie Automobile*, September 25, 1922, xx.

[71] Anonymous, "La conduite intérieure extra-légère Paul Audineau," *La Vie Automobile* 21 (1925): cxxxiv.

[72] Advertisement Audineau, *La Vie Automobile*, March 10, 1925, vii; Advertisement Audineau, *La Vie Automobile*, November 25, 1925, iii. Competitor Vanvooren utilized Silentbloc bumpers for the same purpose. René Charles-Faroux, "Une nouvelle application du Silentbloc: La Carosserie déformable Vanvooren," *La Vie Automobile* 27 (1931): 89–90.

[73] Rolt, *Motoring History*, 115.

[74] Faroux, “Le Silence.”
[75] Pierre Maillard, “Les carrosseries et le bruit,” *La Vie Automobile* 29 (1933): 323–326.
[76] Advertisement Renault, *La Vie Automobile*, July 1931, 10, vii.
[77] Advertisement Citroën, *La Vie Automobile*, September 25, 1927, i.
[78] Pierre Maillard, “Quelques éléments du confort,” *La Vie Automobile* 33 (1937): 278–280.
[79] Engineer René Charles-Faroux was a regular contributor to *La Vie Automobile*.
[80] Charles-Faroux, “Vers le plus grand silence,” 577.
[81] Charles Brull, “Etude des bruits des voitures automobiles,” *Journal de la SIA* 9, no. 5 (1935): 259.
[82] For an overview of the different applications, see Pierre Wolff, “Les applications du caoutchouc dans l’industrie automobile,” *Journal de la SIA* 9, no. 2 (1935): 96–114.
[83] Advertisement Celoron, *La Vie Automobile*, January 25, 1929, xxvi.
[84] Advertisement Silentbloc, *ACF* 4, no. 9 (1926): no page number.
[85] See for example H.-S. Kagan, “Les méthodes de mesure de bruit et leur application dans la construction automobile,” *Journal de la SIA* 11, no. 1 (1937): 3–14.
[86] René Charles-Faroux, “Pour rendre la voiture plus agréable,” *La Vie Automobile* 33 (1937): 107–109.
[87] Marc Chauvierre, “La Mesure du Bruit: La Cellule Photo-Electrique et l’Automobile,” *Journal de la SIA* 6, no. 2 (1932): 1650.
[88] See for example Brull, “Etude des bruits des voitures automobiles,” 259–266; S. Kagan, “Les méthodes de mesure de bruit et leur application dans la construction automobile,” *Journal de la SIA* 11, no. 1 (1937): 3–14.
[89] Because of the logarithmic scale of the decibel an increase of 20 decibels equals almost a four-fold increase of perceived loudness.
[90] Brull, “Etude des bruits,” 265.
[91] For the United States see Mom, “Orchestrating Car Technology.”
[92] See for example Henri Petit, “La 20 HP Rolls Royce,” *La Vie Automobile* 19 (1923): 163–168; ibid., “Essai d’une voiture Pahnhard 16 HP sans soupapes,” *La Vie Automobile* 20 (1924): 71–72; Marc Chauvierre, “Essai de la 11 CV Sizaire Frères,” *La Vie Automobile* 22 (1926) : 381-2; see also Merki, *Der holprige Siegeszug*, 48.
[93] For an overview of the emergence of long-range tourism see Mom, “Orchestrating Car Technology;” for early car tourism in France see Catherine Bertho-Lavenir, *La roue et le stylo. Comment nous sommes devenus tourists* (Paris: Jacob, 1999); the bulletin of the French automobile club (*ACF*) was for the most part dedicated to car tourism.
[94] Maillard, “Les carrosseries et le bruit.”
[95] Henri Petit, “Conduite intérieure ou Torpedo,” *La Vie Automobile* 20 (1924): 196.
[96] Ibid., 197.
[97] Henri Petit, “Essai d’une voiture Panhard 16 HP sans soupapes,” *La Vie Automobile* 25 (1929): 71–72.
[98] Petit, “Carrosserie souple ou rigide?” 239.
[99] Petit, “Carrosserie souple ou rigide?” 239.
[100] See Mom, “Orchestrating Car Technology.”
[101] Géo Lefèvre, “Essaie de deux 15 HP Chenard et Walcker,” *La Vie Automobile* 19 (1923): 360–362.
[102] Anonymous, “Les carrosseries Weymann,” *La Vie Automobile* 20 (1924): clxxxiv.
[103] See for example René Charles-Faroux, “Les carrosseries actuelles,” *La Vie Automobile* 31 (1935): 99–102; Pierre Maillard, “Les tendances modernes en carrosserie,” *La Vie Automobile* 31 (1935): 129–135.
[104] Charles Faroux, “Notre Concours,” *La Vie Automobile* 18 (1922): 409–410.
[105] The American survey had about 2,000 respondents as well. Norman G. Shidle, “Practical Data Gathered for Use in Selling Cars,” *Automotive Industries* 45, no. 8 (1921): 351–354; see also Mom, “Orchestrating Car Technology.”
[106] Advertisement Labourdette, *ACF* 3, no. 6 (1925): no page number.

[107] Advertisement Renault, *La Vie Automobile*, March 10, 1926, xi.

[108] Advertisement Voisin, *La Vie Automobile*, May 25, 1927, xv.

[109] Maurice Goudard, "Que faire pour developer l'industrie automobile en France?," *La Vie Automobile* 23 (1927): 183.

[110] For example Advertisement Renault, *La Vie Automobile*, February 10, 1928, no page number; Advertisement Citroën, *La Vie Automobile*, January 25, 1930, i.

[111] On interwar noise abatement campaigns and complaints about traffic noise see Bijsterveld, *Mechanical Sound*, 91–136.

[112] Laignier, "L'influence des facteurs psychologiques sur la construction automobile," *Journal de la SIA* 3, no. 6 (1929): 604.

[113] Bijsterveld, "Listening to Machines," 325.

[114] David Gartman, "Three Ages of the Automobile: The Cultural Logics of the Car," *Theory, Culture and Society* 21, no. 4/5 (2004): 171.

[115] Peter Burke, *The Art of Conversation* (Itahca, NY: Cornell University Press, 1993), 123–141.

[116] Gartman, "Three Ages of the Automobile," 173; Gijs Mom, *The Electric Vehicle: Technology and Expectations in the Automobile Age* (Baltimore: John Hopkins University Press, 2004), 25, 103, 247.

[117] Gartman, "Three Ages of the Automobile," 173.

[118] Peter Roberts, *Any Color So Long as It's Black: The First Fifty Years of Automobile Advertising* (New York: William Morrow, 1976): 140.

[119] Henri Petit, "Essai de la voiture 20 HP Rolls-Royce," *La Vie Automobile* 19 (1923): 168.

[120] Advertisement Alfa Romeo, *La Vie Automobile*, July 10, 1922, vii.

[121] Advertisement Weymann, *La Vie Automobile*, May 25, 1924, xxiii.

[122] Charles Faroux, "La mort du torpedo," *La Vie Automobile* 22 (1926): 25.

[123] Cartoon La Mode, *ACF* 5, no. 1 (1927): 11.

[124] Charles-Faroux, "Vers le plus grand silence," 578; Advertisement Weymann, *La Vie Automobile*, November 25, 1929, no page number.

[125] Bijsterveld, *Mechanical Sound*, 31–41.

[126] Advertisement Brampton, *La Technique Automobile et Aérienne* 18, 1 (1927): xiii; Advertisement Lincoln *ACF* 4, no. 6 (1927): no page number.

[127] White, "Body by Fisher," 61.

[128] Advertisement Peugeot, *La Vie Automobile*, November 10, 1928, xxx.

[129] Bardou et al., *The Automobile Revolution*, 118.

[130] Laignier, "L'influence des facteurs psychologiques," 605.

[131] Ibid., 599–607.

[132] Ibid., 600.

[133] Ibid., 602.

[134] Advertisement Renault, *La Vie Automobile*, January 25, 1926, xiii.

[135] Advertisement Berliet, *ACF* 7, no. 2 (1929): vii.

[136] Goudard, "Que faire pour développer l'industrie automobile," 183; for American discourses on women, fashion, and automobiles see Cotton Seiler, *Republic of Drivers* (Chicago and London: University of Chicago Press, 2008), 50–60.

[137] Brull, "Etude des bruits," 261.

[138] Advertisement Panhard, *La Vie Automobile*, October 28, 1931, i.

[139] Advertisement Talbot, *La Vie Automobile*, February 10, 1939, xi.

[140] Charles Faroux, "Contre les bruits," *La Vie Automobile* 30 (1934): 89–90.

[141] Faroux, “Le Silence;” Henri Petit, “La voiture automobile actuelle vue par l’usager,” *La Vie Automobile* 30 (1934): 236–239.

[142] Advertisement Manessius, *La Vie Automobile*, March 25, 1925, xii.

[143] Mom, “Orchestrating Car Technology.” For comparison, in 2003, the European Union lowered the allowed exterior noise level for passenger cars to 74 dB(A).

[144] Joseph Bethenod, “Vérités peut-être utiles à dire,” *Journal de la SIA* 12, no. 12 (1938): 444.

[145] For the postwar period, see Bijsterveld, “Acoustic Cocooning”; Michael Bull, “Soundscapes of the Car: A Critical Ethnography of Automobile Habitation,” in *Car Cultures*, ed. Daniel Miller (Oxford and New York: Berg, 2001): 185–202; Mimi Sheller and John Urry, “The City and the Car,” *International Journal of Urban and Regional Research* 24, no. 4 (2000): 737–757.