ON THE CORRECTION OF FOREIGN BROGUE

Breath Stream Control During Transitions in French[1]

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Most phoneticians have set for themselves the task of discovering facts about the pronunciation of a single language, usually their mother tongue, without any reference to other languages. It is true, they frequently make comparisons from language to language, but in so doing they utilize their own discoveries for the mother tongue and the published discoveries of others for other languages. None of the better known phoneticians has ever published conclusions based on a comparative experimental study of two or more languages. Yet that is precisely the type of study on which the correction of foreign accent must be based.

The investigations of most, if not all phoneticians, have been predicated on the basic theory that slight differences in position are responsible for the differences in pronunciation, and consequent foreign brogue. The earlier phoneticians determined these positions by direct observation and rough measurement. By means of the artificial palate the Abbé Rousselot determined the positions with great accuracy, and he thought that in the artificial palate he had found a reliable means of investigation and at the same time an unfailing means for the correction of faulty pronunciation.

The phoneticians seem to ask: What else can determine the difference in sound (pronunciation) from language to language? Is not the effort to produce sound and to expel the breath continuous within the breath group?[2] Are not syllables unreal and without objective existence in normal continuous speech?[3] Is not the

[1]This article is by way of reply to Professor C. E. Parmenter and Dr. S. N. Treviño who begin an article in the June number, 1936, of the PMLA thus:

"It has been stated repeatedly by Professor James L. Barker of the University of Utah that in French the breath stream is interrupted in certain cases after the production of a sound and that the position for the following sound is taken in silence during the interruption. The cases mentioned specifically in which such interruptions occur are the transitions from consonant to vowel, from vowel to consonant, and from consonant to consonant."

And they conclude the article as follows:

"The evidence presented in this paper leads to the conclusion that there is no interruption of the breath stream in passing from consonant to vowel, from vowel to consonant and from consonant to consonant within the phonic group in French."

[2]Sweet, Panconcelli-Calzia, Passy, Grammont.

[3]Panconcelli-Calzia.

transition from one sound to another determined by the law of least effort and the shortest path? And are not transitions made in the same manner in all languages, and of negligible importance?[4] What then deserves attention? Evidently the positions required for the various vowels and consonants as such without regard to the manner in which these positions are taken and left and without regard to the control of the breath in relation to the taking and leaving of the positions. In any case the control of the breath, since the effort to expel it is continuous, would be the same in all languages, and since this is true, it is not a variable factor from language to language, and there is no practical utility in a comparative study of it.

In their denial of the Barker theories Professor Parmenter and Dr. Treviño are led of necessity to the acceptance of the above theories.

In reaching their conclusions they made use of the kymograph and the oscillograph. In reaching my conclusions I made use of the artificial palate and the kymograph, and in this article I am publishing for the first time experiments with the oscillograph.

Though Professor Parmenter and Dr. Treviño do not offer any experiments with the artificial palate, they must place their chief reliance on it for the determination of differences in position. In common with other phoneticians adhering to the theory of no breaks in the breath stream within the breath group, they have advanced no other explanation of the difference in acoustic effect in different languages, as in the case of l in French and l in English, except the difference in position revealed by the use of the artificial palate. Though it is true that differences in position do exist, in 1912 I demonstrated repeatedly to the Abbé Rousselot and to his laboratory assistant, Dr. Chlumsky, that both French and English l can be easily produced with the tip of the tongue in any forward position. In fact, I repeatedly pronounced French l in the so-called English position and English l in the so-called French position and thus demonstrated that the difference in position is not the cause of the characteristic acoustic difference.[5] In *Mechanism* and *Position*[6]

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[4]Paul Passy.

[5]In the *Revue de Phonétique*, dated 1914, but appearing after the War, Dr. Joseph Chlumsky published an article on "Les Consonnes Anglaises Comparées aux Consonnes Françaises à l'Aide du Palais Artificiel et de l'Observation Directe," in which he concludes: "Ce n'est donc pas le point d'articulation qui distingue ce t du t français, ni n'en explique le caractère acoustique," but that "dans l'articulation des t anglais et français, la pointe de la langue fonctionne de façon différente, verticalement en anglais, horizontalement en français. C'est là ce qui produit la divergence acoustique si nettement marquée," and he draws the same conclusion concerning other consonants, for example, l.

The difference in sound is not caused by the slight difference in tongue position. With the use of the artificial palate, Dr. Chlumsky saw me demonstrate to the Abbé Rousselot in 1912 and 1913 that French l could be pronounced in the "English position" and English l in the "French position." Hence the difference is sound could not be due to a slight difference in position. (See *End-Consonants and Breath-Control in French and English*, Modern Philology, 1916.)

What is original in Dr. Chlumsky's article is the theory that the difference in sound is due to the articulation of the front consonants with the tongue in a

I pointed out that all minor differences in position are not the causes of characteristic acoustic differences but are themselves the results of differences in mechanism.

If either the theory of continuous expulsion of breath and production of sound, or of breaks or interruptions in the effort to expel the breath is to be accepted, it should be capable of experimental demonstration. Such demonstration need not be direct; it may be indirect. The demonstration to be complete should show that the theory is not in conflict with known phenomena and that it may be used to solve the problem of the correction of faulty accent.

In respect to its application to the correction of faulty accent, the theory of the continuous expulsion of the breath has signally failed and has even brought phonetics into disrepute. One of the greatest phoneticians of all time, the Abbé Rousselot, during a period of five years, did not succeed in a single case in eliminating English accent in the pronunciation of French.[7] He made extensive use of the artificial palate in the determination and correction of differences in position, but the theory that the expulsion of breath is continuous within the breath group and that accent may be corrected by correcting differences in position failed to stand the practical test. Others have had no better success in the application of this theory to the correction of accent.

How can the theory stand the practical test? Read the texts based on this theory—Rousselot, Grammont, Navarro-Tomás, etc.—and examine carefully their descriptions of **l**, **r**, etc., and in nearly all cases, what is said of French **r** may be said of the corresponding dialectual variety of English **r**, and except for the difference of position what is said of French **l** may be said of English **l**, and yet this one difference of position is inconsequential, since either French **l** or English **l** is easily pronounced throughout the whole range of positions in which any **l** is pronounced.[8]

Professor Parmenter will probably admit that the Barker theories do meet the practical test successfully. He has seen drills based on the Barker theories used in the teaching of pronunciation at the University of Chicago and perhaps would not dispute the fact that such drills are very effective in the teaching of French pronunciation

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vertical position in English and a horizontal position in French. Direct observation should have shown that this theory is not correct. If one will observe the tongue in the pronunciation of the word *milk*, the manner of taking the position for **l** may be roughly vertical, as described by Dr. Chlumsky, but if one will compare the position of the tongue for **l** in *wealth*, *health*, the manner of taking the position of the tongue is not as described by Dr. Chlumsky for English but as described by him for French. In fact there is no one distinctive manner of taking the position for a front consonant in English (see *Mechanism and Position*, Modern Philology, 1922).

[6]J. L. Barker, published in *Modern Philology*, Nov., 1922.

[7]From 1908–1913 I was acquainted with all of the Abbé Rousselot's students in Paris.

[8]Abbé Rousselot, *Précis de Prononciation Francaise*, p. 58. Also see this article, footnote, p. 164 .

and in the correction of faulty accent. Parmenter and Treviño state: Barker "found that by interrupting the breath stream between a vowel and a final consonant he was able to pronounce the final consonant as an initial consonant and thereby satisfy the French ear." In their article they do not question this statement.

In their refutation of the Barker theories, they offer kymographic and oscillographic experiments of their own. In regard to my experiments, they state that I disregard the evidence of "uninterrupted voice vibrations throughout the transitions." Other than this, they make no attempt to show that my experiments were either not correctly performed, accurately described, or properly interpreted.

According to them, the kymograph "offers valid indirect evidence regarding the behavior of the breath stream. If the voice vibrations are found to be continuous and uninterrupted from the beginning to the end of a word such as *bombe*, it follows that there has been no interruption in the breath stream because the vocal cords, which are actuated by the breath, would cease to vibrate if the breath stream were interrupted. Mr. Barker's kymograms frequently show uninterrupted voice vibrations throughout the transitions, but he rejects this evidence and maintains that the kymograph tambour, on account of its mass, continues to vibrate after the impulse from the vocal cords has ceased."[9]

It is true, I have maintained that the inscribing pen "continues to vibrate after the impulse from the vocal cords has ceased." How can it be otherwise? It is generally recognized that any object in movement continues to persist in that movement because of its mass. In the case of the kymograph, to the mass of the tambour must be added the mass of the lever and of the inscribing pen on the end of the lever. (Manufacturers recognize this difficulty of mass and try to reduce it to a minimum by constructing the lever and pen of some light material.) Professor Parmenter and Dr. Treviño assume that the mass of the tambour, of the lever, and of the inscribing pen is of no effect, since they conclude that the instant the vocal cords (actuated by the breath stream) cease to vibrate, the pen ceases to vibrate. If this assumption be true, then Parmenter and Treviño succeeded in overcoming the effect of mass, though they do not claim to have done away with the mass of the tambour, lever, and pen themselves. Is this not absurd?

The inscribing pen does not cease to vibrate instantaneously with the cessation of the production of sound. The effect of mass of the vibrating parts of the kymograph, the tambour, the lever and the inscribing pen is shown in an experiment published in PMLA in December, 1934, Figure 20, page 1181. Any breaks in speech are bridged over in the kymograph owing to the fact that, because of the mass of the moving parts of the apparatus, the vibrating movement of the inscribing pen continues after the exciting cause has

[9]C. E. Parmenter and S. N. Treviño, *The Breath Stream during Transitions in French*, PMLA, June, 1936, page 594.

ceased to operate. Unless they have done away with mass in the moving parts of the kymograph or with the persistence of movement due to mass, their conclusion based on the continuity of vibrations appears unfounded.

They assume "that as long as the vocal cords continue to vibrate there is no interruption of the breath stream. . . . to test the kymograph, simultaneous records were made on the oscillograph from a microphone and on the kymograph from a larynx capsule. The subject pronounced the vowel [u:] three times in succession. . . . In every case the kymogram had the same number of vibrations as the corresponding oscillogram. In no case did the kymograph tambour show any tendency to continue vibrating after the impulse ceased as reported by Mr. Barker."[10]

Unless Parmenter and Treviño succeeded in this experiment in overcoming the effect of mass in the kymograph, what they may well have done is to show, not that the kymograph has no "carry over," but that their oscillograph picked up room reverberation or showed other types of "carry over" itself. Their comparative experiment seems to indicate that their oscillographic experiments are unreliable.

"To test the oscillograph, an oscillator of approximately 300 cycles was connected to two of the vibrators. The current to one of the vibrators was interrupted 120 times per second. The resulting oscillogram showed that the vibrator stops in about two ten-thousandths of a second and starts in approximately the same time. This proves that the vibrator does not continue to vibrate after the impulse from the vocal cords has ceased and establishes the validity of the oscillograms for the problem under consideration."[11]

Since their oscillograph vibrated two ten-thousandths of a second after the impulse from the vocal cords had ceased, it evidently would be incapable of registering a "break" of less duration, and it could only serve to register a "break" of longer duration in case the "break" was sufficiently longer to be legible in the oscillogram. The length of such "breaks" (if they exist in accordance with the Barker theories) is unknown. It should also be noted that the Barker theories require a cessation in the effort to expel the breath and the consequent production of sound, but make no statement as to the length of this cessation of effort or of the persistence of sound at a low level in the air. If the cessation of sound is long enough, their oscillograph would reveal it; if in a given case, the "break" is no longer or but little longer than two ten-thousandths of a second, their oscillograph would be useless as a means of testing the truth or falsity of the Barker theories.

The validity of their conclusions is also subject to another reservation. Their conclusions are not valid if the oscillograph recorded vibrations not produced directly by the organs of speech,

[10] C. E. Parmenter and S. N. Treviño, *The Breath Stream during Transitions in French*, PMLA, June, 1936, p. 595.

[11] *Ibid.*, page 595.

i. e., if it recorded extraneous vibrations, such as room reverberation, amplifier hum, etc.

That this may be the case in the experiments of Professor Parmenter and Doctor Treviño may be seen by an examination of their oscillogram *abdiquer*, Figure 4, opposite page 596, PMLA, June, 1936, reproduced in this article as Figure 1.[12] During the position of closure for the **k**, the tongue shuts off all of the air; moreover, since **k** is a voiceless consonant, no vibrations are produced by the vocal cords. During the time of the occlusion of the **k**, the vibrations of small amplitude here present should be entirely lacking and the occlusion should be represented by a straight line.

"For those (transitions) involving unvoiced consonants, the evidence of the oscillograph is not conclusive because in a filtered oscillogram, an unvoiced consonant is represented by a straight line."[13] Since the occlusion of the **k** is not represented in *abdiquer* by a straight line, this oscillogram was not filtered. Were the other oscillograms filtered? Would unfiltered vibrations bridge "breaks" of any duration in the other oscillograms? Professor Parmenter and Doctor Treviño do not seem justified in offering these oscillograms as evidence that the expulsion of breath is continuous, since the duration of the vibrations in the oscillogram does not coincide with the duration of the production of sound by the speaker.

The oscillograms of Figure 2 to 5 inclusive were made for me some time ago on the occasion of a visit to the Bell Telephone Laboratories. The speakers were three members, American, French, and German, respectively, of the technical staff of the Laboratories who kindly assisted by speaking the word in the ordinary manner. The oscillograms were made in a highly absorbent room with the microphone 3″ to 4″ away from the speaker's lips; the oscillograph was equalized for frequency response up to 9000 cycles and for phase up to 5000 cycles; room reverberations and reflected waves picked up by the microphone

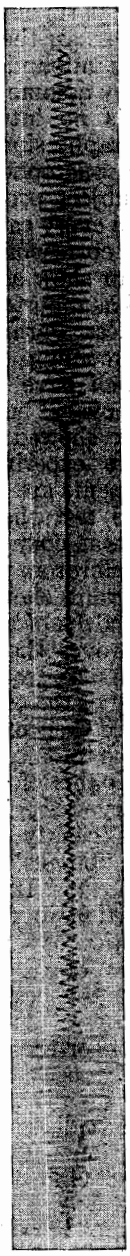

FIGURE 1

Figure 1 reproduces Figure 4 of "The Breath Stream during Transitions in French" by Professor Parmenter and Dr. Treviño, PMLA, June, 1936, page 596. It will be observed that in that part of the experiment in which the vibrations have the smallest amplitude, the position of closure for **k** was being maintained.

[12]Figures 1 and 7 of this article are reproduced with the permission of Doctor Treviño (in the absence of Professor Parmenter); for this courtesy I desire to express my thanks.

[13]C. E. Parmenter and S. N. Treviño, *The Breath Stream during Transitions in French*, PMLA, June, 1936, p. 596.

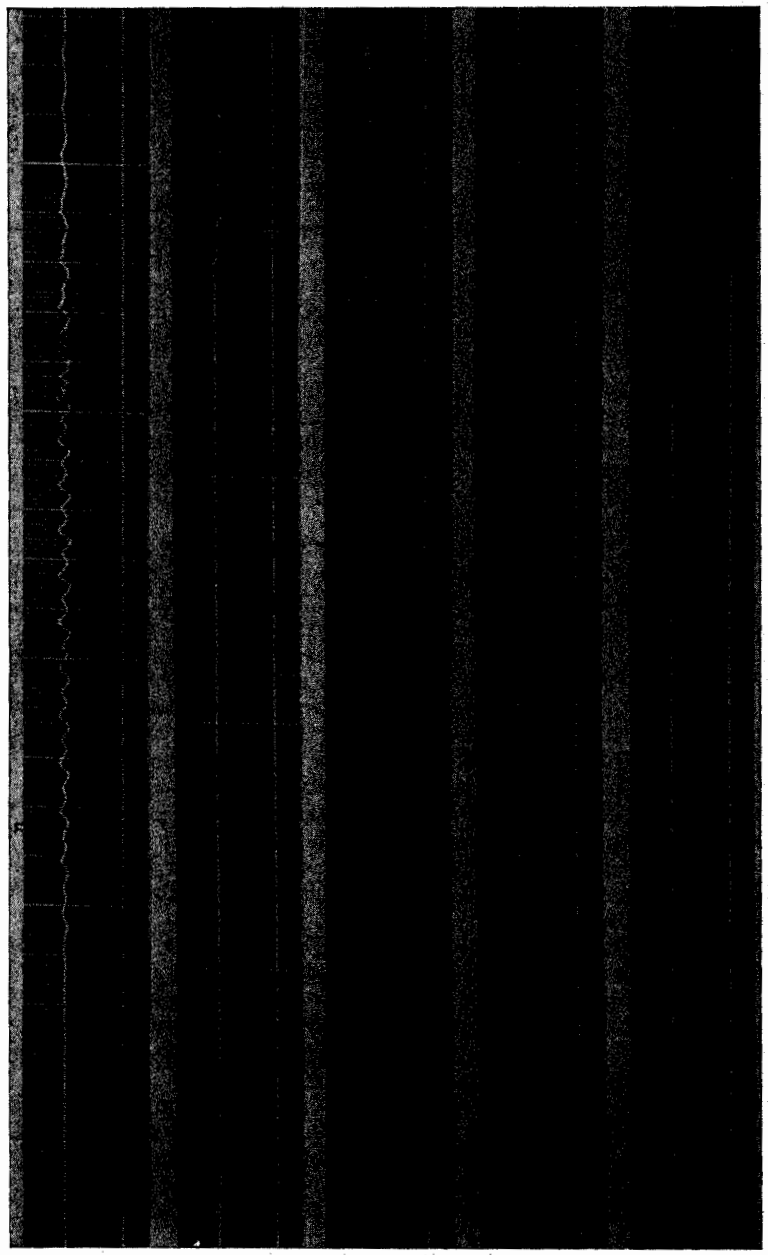

FIGURE 2

Figure 2, *ne tombe pas*, reproduces the American pronunciation of Dr. J. C. Steinberg. **t** is written above the occlusion of the **t** and **o** is written above the small vibrations of the explosion of the **t**. Between the vibrations of the explosion of the **t** and the beginning of the large vibrations of the **õ**, the vibrations continue without interruption. **p** is placed over the line just before the moment of the explosion of the **p**. From the moment of the explosion of the **p**, the vibrations are seen to be continuous throughout the duration of the word.

were not more than one one-hundredth of the amplitude of the direct sound waves which they portray. For the courtesy of performing these experiments I wish to express my gratitude to the Bell Telephone Laboratories, but the conclusions drawn from them are my own and the Laboratories are in no way responsible for them.

Figure 2 reproduces the American pronunciation of "S." It will be observed that the explosion of the **t** and the nasal vowel (*tombe*) merge together according to the Barker theory of continuous effort to expel the breath within (most) syllables in English. From the moment of the explosion of the **t,** the vibrations are seen to be continuous throughout the duration of the word. Theoretically, this continuity of the vibrations could be due to reverberations. However, the set-up was unchanged in the following French and German experiments in which the "breaks" in the continuity of the vibrations are in conformity with the Barker Theories.

Figure 3 represents the French pronunciation of "D" of (French) *ton.* Figure 4 represents the German pronunciation of (French) *ton* by "W." The vibrations of the explosion of the **t** in Figures 3 and 4 die out before the nasal vowel begins. Compare these experiments with the American pronunciation of (French) *tombe,* Figure 2, of "S," where the vibrations are continuous.

All three experiments were performed under the same conditions. Since an interruption in the effort to produce the sounds may be bridged over by reverberations, the absence of such a break in the vibrations between two sounds would not prove that the effort to expel the breath or the production of sound is continuous; on the other hand, because the microphone picks up sounds (of sufficient intensity) from any source, including the vibrations produced by the explosion of the **t** and the vocal cords for **õ** (**on**), the "break" in the vibrations offers sound evidence in favor of the discontinuity of the effort to expel the breath and the production of sounds in French and German in accordance with the Barker theories.

Figure 5 represents the pronunciation of M. DeCoutouly of *acte.* It will be observed that there is a separate explosion both for **k** and **t,** in accordance with the Barker theory that each sound in French is pronounced by itself.

Figure 6 represents the pronunciation of Herr Walther of *akt.* It is evident that the **k** has no explosion. The **t,** however, is exploded. This is in agreement with the Barker theory of German pronunciation: a consonant preceded by a vowel in the same syllable is pronounced as the glide is made on the vowel into the consonant, and a following consonant is exploded, being pronounced by itself.

Other experiments with the oscillograph in confirmation of the Barker theories are available. On the other hand the oscillographic evidence offered in opposition to the Barker theories by Parmenter and Treviño is apparently defective.

The oscillograph does not register the breath stream directly but picks up sound vibrations (from any source) in front of the microphone. Consequently, it is difficult to determine whether the

FIGURE 3

Figure 3, *ton*, offers the French pronunciation of Mr. G. C. DeCoutouly. The legend is written at the top: **t**, above the occlusion of the **t**; **o**, above the explosion of the **t**; and **õ**, above the nasal vowel. Observe that the vibrations of the explosion of the **t** die out before the vibrations for **o** begin. Compare this with the American pronunciation of Dr. J. C. Steinberg of *ne tombe pas*, Figure 2, where the vibrations are continuous.

FIGURE 4

Figure 4 represents the German pronunciation of *ton* by Mr. H. Walther. Again the legend is written at the top of the experiment; **t**, above the occlusion of the **t**; **o**, above the explosion of the **t**; and **õ**, above the nasal vowel. Observe that the vibrations for **õ** begin after the vibrations of the explosion of the **t** have ceased. Compare this experiment with the American pronunciation of *ne tombe pas*, Figure 2, of Dr. J. C. Steinberg, where the vibrations are continuous.

"evidence" offered by it really corresponds to the objective facts of pronunciation.

Evidence in favor of the continuity of the breath stream and evidence contradictory to the theory of continuity are in both cases indirect evidence; however, the two are not of equal value. Since the microphone picks up vibrations in front of it from any source whatsoever, it is to be assumed, if no vibrations were picked up, that there was no source of vibrations present of sufficient intensity to be registered by the oscillograph, including that which would have been furnished by the breath stream if it had been continuous. If vibrations are picked up, it only proves that there were vibrations in front of the microphone but leaves their source a matter for investigation. And there always remain three possible sources of these vibrations other than the one that would arise from the continuity of the breath stream, namely, reverberations from the walls of the "sound-proof" room, which never absorb absolutely all of the sound, reverberations from objects and persons in the room itself, and, in addition, vibrations resulting from some vibration mode of the recording apparatus. Consequently, though the oscillographic evidence reproduced in this article in favor of the Barker theories must be accorded serious consideration, any evidence contrary to them furnished by the oscillograph should be supported by evidence from other sources.

Professor Parmenter and Dr. Treviño offer evidence other than oscillographic experiments. They present experiments with the kymograph. We have seen that they conclude that the kymograph has no "carry over." They could have offered a direct test of the "carry over" of the kymograph, as was done in one of my articles,[14] by producing explosions (pistol shots) of varying loudness and recording the length of time during which the tambour with its inscribing lever and pen continued to vibrate; they could have performed this experiment or a similar one and shown wherein my conclusions are not valid.

Let us examine their kymographic experiments. The larynx tracing in Figure 5, *cette tante*, "shows that the voice vibrations are continuous from the release of the preceding [**s**] until the closure for the [**t**] is complete."[15] This conclusion rests solely on the accuracy with which Professor Parmenter and Dr. Treviño have been able to fix the limits of the sounds.[16] In this they have manifestly failed, because, were the statement true, the **s** would not be **s** but **z**; and the **t** would not be **t,** but **d**. However, the **s** is an **s**, and the **t** is a **t,** for during the occlusion in each case no vibrations are present.

[14]J. L. Barker, *Beginning-Consonants and Breath-Control*, PMLA, December, 1934, page 1181.

[15]C. E. Parmenter and S. N. Treviño, *The Breath Stream during Transitions in French*, PMLA, June, 1936, page 597.

[16]Others have thought that the division of the sounds as recorded by the kymograph must be made arbitrarily (not accurately). See *La Question du Passage des Sons*, Jos. Chlumsky, Revue de Phonétique, vol. 2, page 80.

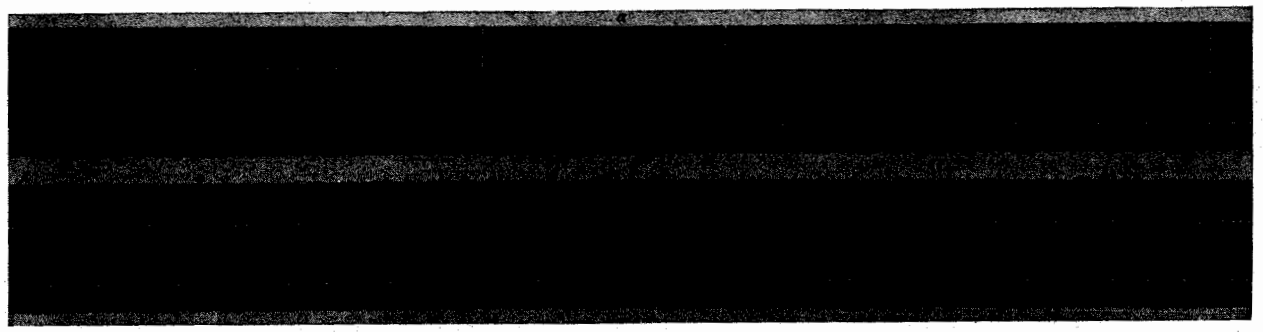

FIGURE 5

Figure 5, *acte*, French pronunciation of Mr. G. C. DeCoutouly. The legend is written at the top of the experiment: **a** is above the vibrations for the **a**; **k**, above the occlusion of the **k**; **o**, above the explosion of the **k**; **t**, above the occlusion of the **t**; and **o**, above the explosion of the **t**. Observe that the separate explosions for **k** and **t** are clearly visible. Compare this experiment with the German pronunciation of Dr. Walther of *akt*, Figure 6, where the explosion of the **k** is completely lacking.

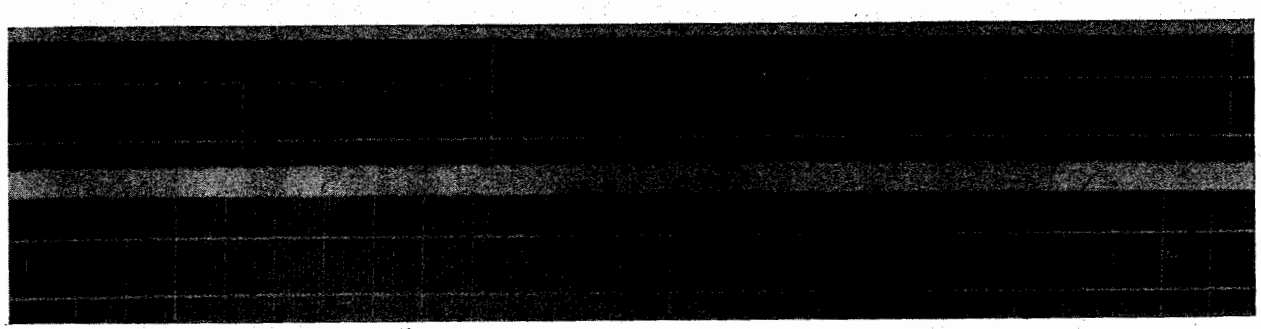

FIGURE 6

Figure 6, *akt*, German pronunciation of Mr. H. Walther. The legend at the top of the experiment is as for Figure 5; however, **k** has no explosion. In the oscillogram for English *act* (no figure), neither **k** nor **t** have an explosion Figures 5 and 6 are in accord with the Barker theories for German and French pronunciation as contrasted with each other and with the pronunciation of English.

Let us look further at their kymographic experiments. Referring to their Figure 5, *cette tante*, reproduced here as Figure 7, they state: "The spirograph tracing shows that our subject did not explode the first [t] and that he did not lower his tongue between the two [t]'s since the spirograph line would have dropped if he had done so. He, therefore, did not interrupt the breath stream, and the result was a long [t:] with continuous and uninterrupted pressure."[17] If the pressure were continuous and uninterrupted, one would expect a rise in the spirograph line recording the pressure or at least that this line would not drop. If my interpretation of their statement: "The spirograph line would have dropped if he had done so" (exploded the first **t** and lowered his tongue between the two **t**'s) is correct, then they maintain that the air pressure did not decrease and that the line did not drop. An observation of their Figure 5 (our Figure 7) shows that this is not borne out by the experiment. The line after recording the maximum pressure first drops, and then rises again,

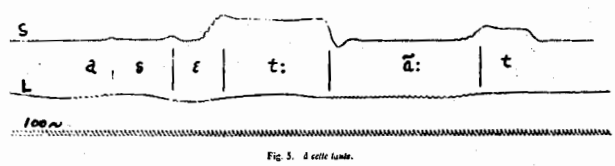

FIG. 7. This reproduces Fig. 5 of Professor Parmenter's and Doctor Trevino's article.

The behavior of this curve would not be different if the Barker theory is true. The first **t** would be exploded with just enough lowering of the tongue to permit the escape of air. Though this would reduce the pressure, it would not reduce it greatly, and consequently, the line would not drop very much. The tongue would then be raised for the plosion of the second **t** and this would increase the pressure again but would not increase it greatly. The important fact is, that between the **t** of *cette* and the **t** of *tante*, the pressure dropped. They state: "The spirograph line would have dropped" if the subject had exploded the first **t**. Consequently, they *should* have concluded that their subject did explode the first **t** in conformity with the Barker theory. Such evidence as is offered by the experiment, their Figure 5 (our Figure 7), does not invalidate but, on the contrary, supports the Barker theory.

They were under no necessity of trying to fix the exact limits of the vowel and the consonant in *cette tante* and of studying the air pressure in the line of the spirograph in order to determine whether the tongue is lowered or not between the **t** of *cette* and the first **t** of

[17] C. E. Parmenter and S. N. Treviño, *The Breath Stream during Transitions in French*, PMLA, June, 1936, page 597.

tante.[18] They could have registered the movement of the tongue itself, as I have done in Figure 8. Contrary to the theory of M. Maurice Grammont supported by Parmenter and Treviño of "long" (double) consonants in French requiring that the **t** of *cette* should have no explosion and the first **t** of *tante*, no implosion, it is seen in Figure 8 that each **t** has its separate implosion, plosion, and explosion. And contrary to M. Grammont's theory (also supported by Parmenter and Treviño) that the only difference between a simple (single) consonant and a "long" (double) consonant is in the length of time the position of closure is held, it is seen that the length of the final **t** of *tante* is as great as the combined length of **t** of *cette* and the initial **t** of *tante*.[19] Were the theory of "long" (double) consonants correct, the final **t** of *tante* would be a "long" (double) consonant.

FIG. 8. In the experiment, *à cette tante* by Joseph Thalman, FT, gives the movement of the front part of the tongue; BT, the movement of the back part of the tongue; M, the line of the mouth; S, the line of the spirograph recording the air pressure in the mouth back of the point of contact of the tongue; and N, the line of the nose.

According to this theory, a so-called "double consonant" is not a "double" consonant at all, but a "long" consonant, that is, a consonant differing from an ordinary consonant only in respect to the length of time the position required for the consonant is held. I have shown in M. L. A. meetings and also in a published article[20]

[18]"In order to study the behavior of the breath stream in the transitions preceding the following unvoiced occlusives, the spirograph and larynx capsule were used. The spirograph tracing, marked S on the kymograms, shows the implosion, plosion, and explosion of the occlusive. The larynx tracing, L, shows the voice vibrations. By comparing the two tracings in respect to time, it is possible to determine at what point in the course of the articulation the voice vibrations begin and end."—C. E. Parmenter and S. N. Treviño, *The Breath Stream during Transitions in French*, PMLA, June, 1936, page 597.

[19]Numerous experiments are reproduced in my *An Explanation of Differences in the Length and Voicing of Consonants in French and English*, Modern Philology, Feb., 1929; see also *Syllable and Word Division in French and English*, Modern Philology, Feb., 1922.

[20]*Differences in Length and Voicing of Consonants in French and English*, Modern Philology, Feb., 1929.

that a single consonant may be and often is longer than a (so-called) "long" consonant.

This may be seen in Figure 9, representing the pronunciation of *à cette tante* by Mme Janine Cleyet Jacobs and of *that time* by Mr. Randall Barker. By measuring the length of the tongue curves for the two **t**'s of *that time* and the initial **t** of *tante*, it will be seen that the time of the two **t**'s ("long" **t**) is considerably shorter than the time of the one (initial) **t** of *tante*. Such an experiment, which anyone may repeat, should be fatal to a theory, resting on no other evidence and requiring that a "long" (double) consonant be long and a simple consonant short and maintaining that there is no other difference between the two. In fact, the "long" (double) consonant is often short and the simple consonant is often long. This "long" consonant theory can be maintained only with an utter disregard for facts.

FIG. 9 represents the pronunciation of *that time* by Mr. Randall Barker and the pronunciation of *à cette tante* by Mme. Janine Cleyet Jacobs. In this form the experiment is an accident, but it has been reproduced because it facilitates the comparison of the consonants. The photographer photographed the pronunciation of Mr. Barker and then, forgetting to change the film, photographed the pronunciation of Mrs. Jacobs on the same negative. The line FT gives the movement of the front tongue; BT, the movement of the back tongue; M, the line of the mouth; and S, the line of the spirograph in the pronunciation of Mr. Barker. Just below each of the lines marked FT, BT, M, S, are corresponding lines beginning with *a*, which figure the movement of the front tongue, back tongue, the mouth line, and the spirograph line, respectively, in the pronunciation of Mrs. Jacobs.

The theory of continuity in French pronunciation for which no one has ever offered any serious evidence, probably led M. M. Grammont to the theory of long consonants: "Lorsqu'une consonne finale qui se prononce se trouve devant une consonne initiale, il peut se présenter plusieurs cas suivant la nature de l'une et de l'autre consonne:

1° les deux consonnes sont la même consonne. Dans ce cas on prononce non pas deux consonnes, mais une consonne double, c'est-à-dire une implosion, une tenue et une explosion (theory of "long" consonants defended by Parmenter and Treviño); la consonne finale n'a pas d'explosion, la consonne initiale n'a pas d'implosion

(also defended by Parmenter and Treviño)." M. Grammont cites as examples *pat(te) tordue* and *coup(e) pleine*. As the tongue behaves in *cette tante* or *pat(te) tordue*, so should the lips, according to M. Grammont, behave in *coup(e) pleine*. According to this theory and the theory of "long" consonants, defended by Parmenter and Treviño, as just quoted,[21] the lips take the position of closure for the first **p** and do not open again until the second **p** is exploded, the **p** of *coupe* should have no explosion and the **p** of *pleine* no implosion. Since **p** is a lip consonant, this is easily determined by high-speed photography.[22] Professor Parmenter was present (if my memory serves me well) when the pronunciation of *coupe pleine* by Mme. Moussu of the Alliance Francaise was photographed in the Pathe studios near Paris. Mme. Moussu accepted the statement of the theory by M. Grammont, but her pronunciation of *coupe pleine*, enlarged and shown here as Figure 10, shows the explosion of the first **p**. This high speed photography shows the movement of the lips without the necessity of recourse to the very indirect means employed by Professor Parmenter and Dr. Treviño.

"Figure 6 illustrates the method of passing from an unvoiced occlusive to a voiced occlusive in *lac d'or*. Of this combination Mr. Barker says: 'In French, two such consonants are pronounced successively, and each of the consonants has its (physiological but not acoustic) implosion, its stop and explosion.'[23] The spirograph tracing shows that our subject started the voicing for the [**d**] before the air pressure had reached its lowest point and that there was consequently no interruption of the breath pressure while the position for the [**d**] was being assumed."[24]

The mere fact that the vibrations for the **d** begin before the air pressure as registered by the spirograph falls to zero would seem

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[21]Maurice Grammont, Traité Pratique de Pronunciation Francaise, pages 95–97.

[22]"It is, of course, impossible to determine from motion pictures whether the breath stream is interrupted or not."—C. E. Parmenter and S. N. Treviño, *The Breath Stream during Transitions in French*, PMLA, June, 1936, p. 594.

On page 597, ibid., Parmenter and Treviño seek to prove that the position of the tongue for **t** in *cet(te)* is not left before pronouncing the initial **t** of *tante*, and then add: "He therefore did not interrupt the breath stream." They reason that if the position of the first consonant had been eft and the position of the second consonant taken again, the breath stream would have been interrupted, and on the contrary, if the position for the first consonant is not left before the second consonant is pronounced, that the breath stream is not interrupted; that is, they seek to determine the behavior of the breath stream by noting the behavior of the tongue while pronouncing the two consonants. If this reasoning is correct, then their statement quoted concerning motion pictures is incorrect, since the behavior of the lips in pronouncing a "long" (double) consonant is easily determined by high-speed photography, and having determined what they consider the essential fact, their reasoning would then apply: "He therefore did (or did not) interrupt the breath stream."

[23]J. L. Barker, *An Explanation of the Difference in Length and Voicing of Consonants in French and English*, Modern Philology, Feb., 1929, page 342.

[24]C. E. Parmenter and S. N. Treviño, *The Breath Stream during Transitions in French*, PMLA, June, 1936, page 597.

to prove nothing at all, because the air pressure transmitted through the tube and tambour and registered on the kymograph would have a certain retardation as compared with the effort to pronounce. In this case this is especially true, since the tongue raised in preparation for **d** would block in part the escape of the air after the pronunciation of **k.** Professor Parmenter and Dr. Treviño are assuming without proof that the instant the **c** [**k**] was exploded, the air pressure would register as zero pressure.

"Figure 7 shows the words *la place.* Mr. Barker says: '. . . there must be a break in the air current after [**p**] and before [**l**] in French *place.* . . .'[25] As may be seen in the figure, the vibrations for the [**l**] begin before the spirograph line reached its axis. Had the breath stream been interrupted, the spirograph line would have dropped below the axis before the vibrations for the [**l**] began."[26]

No proof is offered for the statement that "had the breath stream been interrupted, the spirograph line would have *dropped below the axis* before the vibrations for the [**l**] began." In fact, were it not for the mass of the vibrating parts of the kymograph, the spirograph line would not drop below the axis. The duration of the spirograph line for **p** need not correspond in length to the duration of the effort to expel the breath when **p** is exploded. The relatively close position of the jaws while pronouncing **p** followed by **l** and the blocking action of the tongue as **l** is prepared cause the breath to escape slowly after the explosion of the **p,** and it is only as the breath escapes that the pressure as recorded by the spirograph line diminishes. It is difficult to say how this experiment can be offered as proof of anything.

"Figure 8 represents the phrase *ne tombe pas.* Mr. Barker finds that in words like *tombe* and *maintenant* '. . . there is a break or interruption in the air current between the (nasal) vowel and the following consonant.'[27] Figure 8 shows that the voice vibrations on the larynx line are continuous from the beginning of [ɔ̃] to the end of [**b**] in the word *tombe* and that there was no interruption of the air current between them."[28] The argument here depends entirely on the assumption that Parmenter and Treviño overcame the effect of mass or on their success in overcoming the operation of what is generally considered an indisputable law of physics.

". . . Figure 9, *maintenant,* shows continuous vibrations on the larynx line from the beginning of the [**m**] to the plosion of the [**t**]. The spirograph line shows vibration throughout the implosion of the [**t**]. This means that there was breath pressure and vibration of the vocal cords during the time of the physiological shift from the

[25]J. L. Barker, *Beginning-Consonants and Breath Control in French and English,* PMLA, Dec., 1934, page 1169.

[26]C. E. Parmenter and S. N. Treviño, *The Breath Stream during Transitions in French,* PMLA, June, 1936, page 600.

[27]J. L. Barker, *Beginning-Consonants and Breath-Control in French and English,* PMLA, Dec., 1934, page 1167.

[28]C. E. Parmenter and S. N. Treviño, *The Breath Stream during Transitions in French,* PMLA, June, 1936, page 600.

position of the [ɛ] to that of the [t]."[29] If it is true that the vibrations of the larynx were continuous from the beginning of the **m** to the plosion of the **t**, then the subject did not pronounce **t** but **d**, since the difference in voice is the one essential difference between the two consonants. However, the lack of vibrations during the holding of the position of the **t** shows that the subject really did pronounce **t**; i. e., it shows that the vibrations "on the larynx line" either do not correspond rigidly with the vibrations of the larynx

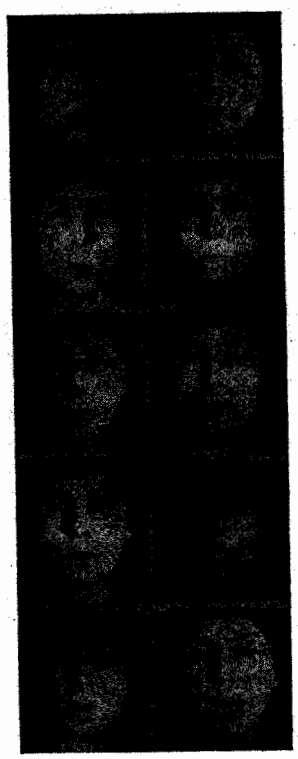

Fig. 10. (c)oup(e) pl(eine) by Mme. Moussu is reproduced from a high-speed motion picture film taken in Paris in 1925. This illustration begins with **u:** in the pronunciation of ***coupe*** and ends with the **l** in ***pleine***. It may be noticed that the lips close for the first **p**, open slightly for the explosion, close again for the second **p** and open for its explosion. The tongue then moves into position for **l**. Owing to the length of the film it is impossible to produce the entire experiment, but by selecting every fifth print (1, 6, 11, 21, 26, 31, 36, 41, 44), except in the case of **l**, where it was necessary to select the 44th print, because the shift was made so quickly, conclusive evidence is offered that the **p** in ***coupe*** and the **p** of ***pleine*** are not pronounced as a long **p**, but as two separate consonants with an explosion following each. (The entire print is in the hands of the editor.)

itself or else the statement that they are continuous on the larynx line from the beginning of **m** to the plosion of **t** is not correct. Moreover, the statement, "the spirograph line shows vibrations throughout the implosion of the **t**," is also proof of the effect of mass in the kymograph, because had the larynx vibrated until the instant the tongue touched for **t**, not **t** but **d** would have been pronounced. It would seem then that no weight should be attached to conclusions based on this experiment.

[29] C. E. Parmenter and S. N. Treviño, *The Breath Stream during Transitions in French*, PMLA, June, 1936, page 601.

"Figure 10 shows *le pain*. In the word *pain* Mr. Barker finds that '. . . the [**p**] is exploded, the flow of the air current interrupted, and then when the rest of the shift in position to the vowel has been completed, [ɛ̃] is produced as the expulsion of the air is resumed.'[30] The larynx line in Figure 10 shows that the voice vibrations start at the beginning of the explosion of the [**p**] and continue to the end of the [ɛ̃]."[31] The statement is made "that the voice vibrations start at the beginning of the explosion of the **p**." A close examination of the figure will show that they start soon after the explosion of the **p**. In fact, if they started at the explosion of the **p**, the **p** would not be a **p** but a **b**. I have already published numerous experiments covering the points above. Professor Parmenter and Dr. Treviño, aside from stating that I neglect continuity of vibrations, apparently did not consider my experiments of sufficient importance to merit examination or refutation. Their own experiments should be examined carefully. If, as I have stated, their descriptions are either faulty (oscillographic experiments) or are not correctly described or the description of the experiments does not justify the conclusions drawn, no weight should be attached to their conclusions.

"Figures 1 to 4 are oscillograms of the words ***même, belle, bombe,*** and ***abdiquer***. It will be seen that the voice vibrations are continuous from the beginning to the end of the first three words. This indicates that there was no interruption of the breath stream during the transitions."[32]

The argument in connection with Figures 1 to 4[33] "that the voice vibrations are continuous" and that therefore "there was no interruption of the breath-stream during the transitions" is the usual argument and the only factual "evidence" that has ever been advanced in favor of the theory of the continuous expulsion of the breath.[34] Unless it is assumed that when a pendulum is hit, it ceases to swing with the termination of the impact of the blow and that mass is of no effect, I do not know how anyone can consider this position tenable; nevertheless, it is the argument of Parmenter and Treviño, and has been widely accepted without any other supporting evidence.[35]

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[30]J. L. Barker, *Beginning-Consonants and Breath-Control in French and English*, PMLA, Feb., 1934, page 1177.

[31]C. E. Parmenter and S. N. Treviño, *The Breath Stream during Transitions in French*, PMLA, June, 1936, page 601.

[32]C. E. Parmenter and S. N. Treviño, *The Breath Stream during Transitions in French*, PMLA, June, 1936, page 596.

[33]C. E. Parmenter and S. N. Treviño, *The Breath Stream during Transitions in French*, PMLA, June, 1936, page 596.

[34]Experimentelle Phonetik, Panconcelli-Calzia.

[35]Shortly before the publication of Parmenter's and Treviño's article, Dr. Hubert Pernot wrote under *Transcriptions Phonétiques* in the *Revue de Phonétique*:

"Les deux textes qui suivent donnent des exercices destinés aux commeçants. Non seulement la prononciation y est syllabique, mais chaque syllabe doit etre pronouncée séparément. On obligera les élèvès à lire très lentement, en s'arrêtant

entre les syllabes. Quand on jugera que leurs consonnes et surtout leurs voyelles sont suffisamment bonnes, on pourra leur faire grouper les syllabes en mots, mais en les obligeant toujours à prononcer lentement. Les principes sur lesquels est basée la division en syllabes seront donnés plus tard dans cette Revue.

"On remarquera que le mot *cigale* par exemple est considéré comme formant trois syllabes (**si 'ga- lə**), chacune de ces syllabes étant du type *consonne-voyelle*. Le petit (ə) qui termine certains mots est une résonance vocalique plutôt qu'un (ə) véritable. Nous accoutumons nos élèves a prononcer ainsi au début et pendant assez longtemps, pour leur apprendre la détente finale, qui est un fait important de la prononciation française. L'usage de cet (ə) aide en outre à améliorer L'articulation de certaines consonnes, comme l' (ə) final américain dans le mot *bel* (**b ɛ-lə**)."—*Revue de Phonétique*, 1928, p. 147.

Observe that words are to be broken up into syllables of the type "consonant-vowel" and especially that final consonants are to be pronounced with a following explosion (this term mine) which is a "vocalic-resonance" rather than a true mute **e** (ə) (distinction used by me), and observe also that this applies to words of the type *bel* (used in my first experiment) where the word ends in a consonant.

We are told that this is "an important fact in French pronunciation" ("un fait important de la pronunciation francaise") and that the principles on which it is based will be given later in the *Revue de Phonetique*.

This seems to imply that this syllabic division rests on some discovery to be made known by Dr. H. Pernot. Dr. Pernot saw my film (first shown at the meeting of the MLA in Chicago, 1925) when it was presented to the members of the Société de Linguistique de Paris in 1927, and he heard me discuss it in lectures and in private conversations. The indication of syllabic division in the *Revue de Phonétique* appeared for the first time in 1928, twelve years after I had indicated the "detaching" of consonants in *Modern Philology* and three years after I had used it in a text. Dr. Pernot will in all probability not publish the promised "principes sur lesquels est basée la division en syllabes," since in a letter he says: "je ne pense pas qu'il y ait découverte, ni de votre part, ni de la mienne. Elle est pratiquée dans nos écoles primaires depuis des siècles." In any case such a syllabic division is not enough. In the first place it is inconsistent. There is no syllable division as such in a one-syllable word of the type *bel*, yet the final **l** must be detached. Furthermore, there is no syllabic division to be made and Dr. Pernot makes none "dans les mots du type *dormaient* (**dɔr m ɛ**), où l' [**r**] s'allie avec la voyelle précédente." If the **r** is joined on to the preceding vowel, as indicated by Dr. Pernot, the result is one of the various **r** sounds in use in English-speaking countries. In fact, any consonant so pronounced is not a French consonant at all but an English consonant.

Moreover, lengthy articles on "e muet" (such as *Les Voyelles Parisiennes l'e muet*, Hubert Pernot, *Revue de Phonétique*, 1929, pp. 64–151) are without practical value if the detaching of French consonants (Barker theory) is ignored, and unnecessary, if students are taught to detach them.

It should also be noted that though there is usually a "final release" after French consonants, this release must be used only after plosive consonants. After **m, n, l, r,** and after all continuants, the one essential is that the transition from preceding vowel to the consonant be made while no air is being expelled; the explosion (as separate from the "tenue" may be and sometimes is entirely lacking.

Even had Dr. Pernot been able to include all cases of French pronunciation in his syllabic ("pratiquée dans nos écoles primaires depuis des siècles") division it still would have been entirely insufficient. It is absolutely necessary to include the cessation in the effort to pronounce, and that, not only between vowel and following consonant in the same syllable, but also between consonant and consonant, and consonant and following vowel. If there is no cessation in the effort to pronounce between consonant and vowel, it is impossible to avoid an audible off-glide of the consonant and an on-glide of the vowel or the dipthongization of the first part of the vowel. If there is no cessation in the effort to pronounce between vowel and following consonant, there must of necessity be an audible glide between the vowel and the following consonant, and the last part of the vowel is diphthongized. Unless the second consonant is prepared before the first is pronounced, so that one is exploded into the other, as **tr** in English *try*, if there is no cessation in the effort to pronounce between consonant and

consonant, a double consonant must of necessity result, as in *tell Lawrence.* (For details see articles cited below.)

Mlle. Nicolette Pernot has applied this "prononciation syllabique" to the teaching of French pronunciation in her "Cours de Phonétique" used at Middlebury College. She says, Feuille 14: "Toutes les fois qu'on s'arrête pour respirer, c'est-à-dire généralement à la fin d'un groupe phonétique, on entend après la consonne finale une *détente,* qui est un petit bruit vocalique accompagnant la remise en position des organes. C'est une sorte de petit e muet, et nous l'indiquons dans l'alphabet phonétique par "ə"; Feuille 6: "Placer les organes dans la position requise avant de commencer à prononcer" and "ne pas mouvoir les organes pendant toute la durée de la voyelle"; Fueille 4 et Feuille 5: "Si deux consonnes précedènt une voyelle, ces deux consonnes appartiennent généralement à deux syllabes différentes: quel-con-que, **i-ny-til-mā.**"

The "prononciation syllabique" is not enough. It is true that one hears the "détente" after a "consonne finale." It is also true that the position for a vowel in French should be taken "avant de commencer de prononcer" and that the "organes" should not be moved during the entire duration of the vowel; but what is the use of telling the student to take the position of the vowel before he begins to pronounce and to hold the position of the vowel until after the pronunciation is completed, if conformity to another part of the theory and to the phonetic notation makes this impossible? How can the position for the vowel be taken before beginning to pronounce ɛ (e) in "quel-con-que," if contrary to the Barker theory, there is no break in the expulsion of breath between the **k** (qu) and the ɛ (e)? A series of vowel sounds will be produced of necessity while the shift in tongue position is being made from the release of the l to the position of the ɛ (e); that is, the beginning of the ɛ (e) will unavoidably be diphthongized, if the expulsion of the breath continues while the position for the consonant is being left and the position for the vowel is being taken. Again, if there is no break in the expulsion of breath between ɛ (e) and the following l, of necessity the pronunciation will be continuous while the transition is made from the tongue position required for ɛ (e) to that required for **l,** and the last part of the vowel will be diphthongized, such diphthongization being absolutely unavoidable unless, as in accordance with the Barker theory, the effort to expel the breath is suspended while the shift in position is being made from ɛ (e) to **l.** Consequently, the recommendation not to move the organs during the entire duration of the vowel and the recommendation to pronounce the l with the ɛ (e) cannot both be obeyed. If either is done the other is impossible.

Mlle. Pernot also accepts the theory of "long" consonants ("consonnes prolongées"), Feuille 22: "Si un mot se termine par une consonne et si le mot suivant commence par la même consonne, ces deux consonnes se prononcent comme une seule, qui serait longue et qui aurait: une implosion, une tenue (longue), et une explosion." Then the pronunciation from vowel to "long" consonant (consonne prolongée) must continue while the vowel position is being left and the consonant position is being taken: the position of the vowel cannot be held without change, and the end of the vowel is necessarily diphthongized; and the pronunciation from "long" consonant ("consonne prolongée") to vowel must continue while the consonant position is being left and the vowel position is being taken: the position of the vowel cannot be taken before beginning to pronounce, and the beginning of the vowel is of necessity diphthongized.

In English, the effort to expel the air from vowel to consonant in the same syllable is continuous and, in the English pronunciation of French words like *tombe, chance, quelconque,* it results in the production of a consonant as the transition is made from the nasal vowel to the following consonant. If the following consonant is **b** or **p,** the "parasitic" consonant is **m;** if the following consonant is **t, d,** or **s,** the "parasitic" consonant is **n;** and if the following consonant is **g** or **k,** the "parasitic" consonant is **ng.** In all cases the production of the "parasitic" consonant is not intended, but it is produced mechanically as part of the glide: it is the off-glide of the nasal vowel and the on-glide of the following consonant.

The theory of continuous effort to expel the breath, not only results in the contrary-to-fact theory of "long" consonants, but it explains nothing and leaves phonetics a mass of unrelated phenomena. Its application to the correction of accents results in failure.

The Barker theories offer an explanation of the existence of diphthongs, obscure vowels, strongly accented vowels, short consonants, and weakly voiced consonants in the Germanic languages, as contrasted with the Romance and Slav languages. They also explain differences in movement, as recorded by the kymograph and by photography,[35] and applied to the correction of accents, result in unquestioned success.

The evidence in opposition to the Barker theories offered by Professor Parmenter and Dr. Treviño appears to lack validity. Either their experiments themselves seem to be defective or the facts revealed by the experiments appear to be incorrectly stated; moreover, aside from evidence depending on the overcoming of the effect of mass in the kymograph, they present no evidence to invalidate any of the many experiments published by me. The oscillographic and kymographic evidence presented in this paper leads to the conclusion that in accordance with the Barker theories as heretofore published, there is a cessation in the effort to expel the breath and in the breath stream in passing from consonant to vowel, from vowel to consonant, and from consonant to consonant within the phonic group in French. The same may be said of the numerous Slavonic, Romance, Oriental, and other languages mentioned in my article published in the March, 1936, issue of this journal, and if this basic habit is not corrected in the American pronunciation of these nationalities they will always speak with a foreign brogue.

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[35] J. L. Barker, *Syllable and Word Division in French and English*, Modern Philology, Feb., 1922.

J. L. Barker, *The Formation of Voiceless Consonants in French and English*, Modern Philology, Nov., 1922.

J. L. Barker, *Neutral or Supporting Vowels in French and English*, Modern Philology, Feb., 1925.

J. L. Barker, *An Explanation of the Difference in Length and Voicing of Consonants in French and English*, Modern Philology, Feb., 1929.

J. L. Barker, *Rate, Direction, and Continuity of Movement in French and English Speech*, Publication of the Modern Language Association of America, Dec., 1930.

J. L. Barker, *Beginning-Consonants* and *Breath-Control in French and English*, Publication of the Modern Language Association of America, Dec., 1934.

J. L. Barker, *Beginning-Consonants* and *Breath-Control in French and English*, Language, Feb., 1934.

J. L. Barker, *Mechanism and Position*, Modern Philology, Nov., 1922.