

COMMENTARY

Investigating “Physical Mediums” via Audio Signal Processing: A Comment on a Recent Approach

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Abstract—Technological advances in recent decades offer possibilities to study the phenomena of physical mediumship using new approaches of investigation. One new approach is the analyses of supposed “spirit voices” recorded in dark séances rooms during sittings with the alleged physical medium Warren Caylor. These analyses were performed by a professor of applied informatics, Eckhard Kruse. He concluded that the results of his investigations provide evidence, if not proof, demonstrating that these voices are indeed produced by materialized “spirits,” and he publicized this interpretation of his work via various dissemination channels. As I will show in this article, however, Kruse’s approach to studying these “spirit voices” is loaded with conceptual and methodological deficiencies that ultimately render his claims untenable.

Keywords: Physical mediumship—spirit voices—voice analyses—Eckhard Kruse—Warren Caylor

Introduction

In recent years, a German professor of applied informatics, Eckhard Kruse, broadcast the results of voice analyses he performed on “spirit voices” that manifested during the séances of an alleged medium for physical mediumship, Warren Caylor, in articles (Kruse 2016a, 2016b, 2018a), on his website (Kruse 2017a, 2017b, 2018b, 2018c), and in talks and interviews (e.g., Kruse 2016c, 2017c, Maier 2016). Hardly knowing anything about physical mediumship before, he was first introduced to the strange phenomena that happen in that context in spring 2015 by Lucius Werthmüller, the head of the Basel Psi Association, when he visited a public séance of another ostensible physical medium, Kai Mügge (Kruse 2015, 2016a). Kruse became fascinated by what he experienced, and he tried

to advance studies into physical mediumship (Kruse 2015, 2017d). With the permission of Werthmüller and the supposed mediums, he introduced technical equipment into séance rooms to document and analyze some of their phenomena. The voices Kruse analyzed were recorded during the séances of Caylor at the Basel Psi Association. For this purpose, Kruse mounted four microphones to a wall at a distance from each other. The recordings of these four microphones allow for the audio-localization of the source of a “spirit voice,” and indeed he was able to trace the movements of voices that are thought to belong to fully materialized “spirits” inside the séance room after analyzing the recordings with special software. Moreover, Kruse analyzed these recorded voices further regarding certain characteristics of human voices and their formants. These formants represent amplitude peaks in the frequency spectrum of voices, and they are determined by the individual anatomical makeup of one’s vocal tract. Important formants include formants F1–F4, as they are considerably involved in shaping the individual characteristics of the sound of human voices. Kruse believes that the frequencies of F3 and F4 can hardly be altered when people disguise their voice even dramatically, and he claims that their alleged immutability would represent an important feature of “voice forensics.” During the séances, he recorded voices that displayed considerable differences in F3 and F4. Consequently, Kruse considers the phenomena of Caylor genuine (e.g., Kruse 2016a, 2016b, Maier 2016), and stated that his measurements of Caylor’s “spirit voices” exclude all possibilities of producing them in a fraudulent manner that lead to hypotheses of deception *ad absurdum* (Maier 2016:179). In his other contributions on this subject, Kruse advanced basically the same opinion, albeit in more or less attenuated formulations.

Moreover, Kruse considers the binding and gagging methods applied to secure Caylor at the Basel Psi Association safe, and he assumes that Caylor always rests bound and gagged on his chair throughout the séances (Kruse 2016b, 2016c, 2017a, 2017b, 2017c). Apparently, he holds much sympathy for Caylor and other alleged mediums, and he doesn’t deem it possible that they might be cheating on him, although the history of physical mediumship brims with examples in which researchers were duped by supposedly honest and trustworthy medium-friends (for numerous examples see Gulat-Wellenburg, Klinckowstroem, & Rosenbusch 1925). A famous example of the past concerns the pseudo-medium Ladislaus Laszlo (Schrenck-Notzing 1924), a recent example concerns Kai Mügge (Nahm 2014, 2016).¹

Kruse’s approach to studying séance phenomena using sophisticated modern technologies is innovative and interesting, and clearly it helps to obtain insights into the phenomena occurring in séances held in complete darkness. Nevertheless, as I will show in the present article, Kruse’s claim that

his investigation provides evidence (or even proof) that the “spirit voices” manifesting at Caylor’s séances are genuine, is premature and untenable. Nevertheless, Werthmüller and other uncritical actors sympathizing with parapsychology, physical mediumship, and esoterics, propagate Kruse’s claims further in interviews and talks (e.g., Werthmüller 2017). Hence, to counter the growing stream of misinformation to the public, a few comments on the medium Kruse investigated and on the methodological approach he pursued seem apt. In the following, I will first comment on typical control measures applied at the Basel Psi Association to secure ostensible mediums, then on the supposed medium Warren Caylor, and finally, on the crucial feature of Kruse’s voice analyses, the determination of voice formants.

Comment on the Controls Applied at Commercial Sitzings with Alleged Physical Mediums at the Basel Psi Association

To begin with, it should be noted that the methods of binding and controlling “mediums” to prevent them from producing fraudulent phenomena at the Basel Psi Association are not compelling. I came to this appraisal after visiting several séances with different commercial mediums promoted at this location. In particular, I found that I was able to free myself very easily when I re-enacted as closely as possible the binding methods I once applied to one of these mediums, Bill Meadows. This happened as follows: At a commercial séance held with this claimed medium on October 10, 2010, I was invited to tie cable binders around Meadows’ wrists to secure his arms on the arms of the chair. On both arms, these cable ties were led through an envelope of jeans material to render them more comfortable on Meadows’ skin. These envelopes were closed with a Velcro fastener, and the ends of the cable ties stuck out on both ends of these envelopes. I fastened these cable ties around Meadows’ wrists until he told me to stop because they would cut into his wrists if I tightened them further.² Indeed, the cable ties in their jeans envelopes seemed to rest tightly around his wrists.

When the séance was over, I cut the cable ties to free Meadows’ wrists with pliers and took the cut cable ties home with me. Using a photograph of the jeans envelopes that had been used, I constructed a jeans envelope of the same size and appearance, including its Velcro fastener. Next, Werthmüller kindly informed me about the precise dimensions (height and width) of the armrest of the chair used at the séance, and I built a wooden beam of the same height and width. Finally, using the cut cable tie from the séance with Meadows as a template, I tightened the same type of cable tie around my right wrist and the wooden beam to exactly the same position as in Meadows’ séance.

Interestingly, my wrist didn’t feel any pressure from the cable tie in its

jeans envelope, and I was able to slip my hand in and out of this supposed bond very easily. Of course, one may argue that all this is irrelevant because Meadows' wrist and hand might have been larger, and that my jeans envelope was not a perfect replica of Meadows' envelope. However, I am sure that Meadows' wrists and hands are not considerably larger than mine, if at all, and that also the possible differences in the dimensions of the jeans envelope are irrelevant. It was so easy to slip out of this bond that it would have required enormous and clearly visible differences regarding the dimensions of our hands and jeans envelopes to prevent Meadows from removing his hand from the ties, and such differences definitively did not exist.

In any case, all *séance*-room phenomena produced by Meadows could have been easily produced by normal means, given if he had slipped out of his bonds. Indeed, it has long been known that supposed mediums who were fastened to their chairs with similar bonds can free themselves easily during sittings. A somewhat famous example concerns a young and likable lady from Brazil, Dona Iris, who gave a sitting for 800 guests in a German town in 1965. Hans Bender, the then head of the Institute for Frontier Areas of Psychology and Mental Health in Freiburg, was very skeptical of public mediums, and he thus secretly observed the *séance* of Dona Iris with infrared spectacles he brought with him. Bender quickly discovered that she had slipped out of her bonds and impersonated the "spirits" herself (Anonymous 1967, Geisler 1965). A prominent recent example of how a fraudulent medium was unmasked concerns Gary Mannion. He was long surrounded by suspicions—especially after a former circle leader and very close friend of his, Michael Mayo, noted several times in dim light that Mannion impersonated the "spirits" himself. At a later *séance* in November 2014, Mayo secretly examined the chair to which Mannion was bound when sitters at the other end of the room claimed they were touched by a "spirit" in the dark—and indeed the chair on which the entranced Mannion was supposed to rest motionless was empty (Anonymous 2016a, Anonymous 2016b). As a result of even more suspicions (Whitham 2016), Mannion was secretly filmed with an infrared camera during a *séance* on May 1, 2016. This very instructive and recommendable documentation of what really happens during *séances* with Mannion is available on the Internet (Anonymous no date).

In general, it appears to be easy to dupe guest sitters who fasten the ties around the arms of mediums. Often, they never secured mediums before, and they are not trained to examine the critical details (I also speak for myself when I was unexpectedly appointed to secure Bill Meadows). As a professional magician informed me, one possibility to manipulate the

binding simply requires lifting one’s wrist a little from the arms of the chair while pretending that the wrists rest on it. A sweater or a shirt with long sleeves is obviously useful to disguise the precise position of one’s wrists. Thereafter, there should be enough extra space to free one’s hands, and the rest is easy to accomplish (e.g., removing and replacing gags and other ties, rearranging clothes, and moving all kinds of objects in the dark). I suppose that this or a similar technique can also be applied when a supposed medium is tied with duct tape, as was the case when Kruse recorded the voices of Caylor’s “spirits.” Hence, the duct tape would not even have to be unfastened audibly to free one’s hands, as Kruse (2018a) believes. Indeed, at the séances visited by Kruse, Caylor wore a sweater with long sleeves, and a photograph of Caylor after one of these séances at the Basel Psi Association shows on close inspection that the duct tape on Caylor’s left arm looks rather loose (Basler Psi Verein 2016). That Caylor’s hands are indeed free during some of his séances is proven by the fact that his hands are sometimes tied to different parts of the chair at the closing of the sitting compared with the beginning. These miraculous occurrences are attributed to “spirit” by his followers, who also seem to consider it impossible that he uses his freed hands to produce séance phenomena.

As for Mannion, he simply let the cable ties be fastened around the thickest parts of his forearms and calves, which obviously renders it very easy to slip out of them (Whitham 2016). For an example of how this might have looked, see the photograph of “medium” Mychael Shane taken before a séance at the Basel Psi Association (Kruse 2017e, 2017f). Arm controls of this kind are completely useless and nothing but eyewash. Of course, Shane’s arm should be properly be secured. Otherwise, for the sake of honesty, the controls should better be relinquished and Shane’s arms left free.³

Similarly, it is not as trivial as it might seem to apply proper leg controls. They only make sense if the front legs of the chair a medium sits on are connected with other legs via stable horizontal structures close to the floor. Otherwise, even if cable ties are tightly fastened around the thinnest part of a medium’s lower legs, one simply needs to remove the *chair’s legs* from the binds by lifting them upward—not the medium’s legs!—and the feet are free. This simple trick can be prevented by fastening the cable ties sufficiently tightly around the mediums legs and *above* the potential horizontal connecting structures between the chair’s legs. If, on the other hand, such structures are located at a height in which the cable ties can only be fastened around the thicker parts of a medium’s lower legs, then the legs can be removed, and the ties are useless again! These very basic aspects need to be taken into account when a medium is supposed to be

secured properly. Moreover, using a chair that creaks audibly when people who sit on it move is recommendable (Nahm 2014), especially for “physical mediums,” who like Caylor are said to rest entranced and motionless on their chair during sittings.

Commercial séances with “physical mediums” at the Basel Psi Association are quite lucrative. Séances such as those visited by Kruse are typically attended by about 20 people, and at present the participation fee is 180 Swiss francs per person (www.bpv.ch). In my opinion, participants of such expensive public sittings should be able to feel certain that the ties to secure supposed mediums are applied in a way that definitively excludes the possibility that they can slip their hands and feet out of them. Regarding Kai Mügge (Nahm 2014, 2016, Braude 2014, 2016), I recommended several suggestions to improve his control, including the use of a creaking chair (Nahm 2014), and I suggested them (and further possibilities) to Werthmüller in email correspondence between June and November 2014 as well. Yet, Werthmüller didn’t think that more stringent controls were necessary because he considered Mügge and Caylor his friends and genuine mediums (email communication to the author on November 26, 2014). Hence, even simple and non-invasive ways to improve the controls are not implemented at the Basel Psi Association. In the light of the above-said and of numerous other aspects not mentioned, it is hardly surprising that many visitors to such commercial sittings hold the opinion that the measures to control supposed mediums at the Basel Psi Association are insufficient.⁴

Comment on Suspicious Aspects of Warren Caylor’s Alleged Mediumship

In the context of the topics described in the section above, it might be of interest that accusations of fraud have been repeatedly advanced against Caylor (a critical overview about suspicions surrounding his alleged mediumship is provided at <http://www.spiritualismlink.com/t91-warren-caylor>; for Caylor’s website see <http://www.warrencaylor.co.uk/>). As it seems, all physical phenomena during Caylor’s séances could easily be staged—provided he would be able to free himself from the bonds. Caylor is a friend of Meadows, and both have given several private séances together. On these occasions, “spirits” of both mediums materialize, communicate with each other and also with the guest sitters in the dark (listen to such an event at <https://app.box.com/s/n4nqgy3vc4zuogz49914>). This is useful to know because if the “spirits” of one of these mediums are fake, then those of the other medium must be fake as well. At Caylor’s séances, voices of many different fully materialized “spirits” can be heard. They include famous celebrities of the past such as “Louis Armstrong” and “Winston

Churchill" (recordings of these and many other "spirits" are available at for example <https://wcaylor.wordpress.com/tag/caylor/>). Also "Michael Jackson" materialized at a séance Kruse visited.⁵

Personally, I never sat with Caylor. Still, I consider it worthwhile to summarize the most important criticisms of his alleged mediumship that are publicly known and available, because most readers will most likely not be familiar with them. Among the many persons who claimed that Caylor freed himself from his bonds on the chair and produced séance phenomena himself are two guest sitters who stated that they clearly recognized Caylor standing in the middle of the séance room, waving glow-sticks in the dark, when the lights of a passing car shone through cracks in window panels (Bland 2008). Similarly, Caylor's former friend and year-long public supporter, Frank Brown, claimed eventually that he and several other sitters recognized Caylor moving around a séance room in comparably bright light. Caylor impersonated one of his "spirits," an American Indian named "Yellow Feather," and spoke with the latter's typical voice. All present sitters except for one clearly recognized Caylor, and immediately thereafter his formerly stable home circle was disbanded by its disillusioned members (Anonymous 2009).

Further instructive reports of sittings with Caylor were provided by Riley Heagerty (2009), who described, among numerous other suspicious aspects of Caylor's mediumship, how the latter was recognized two times walking around in the séance room while pretending to be "Yellow Feather." The first time, "Yellow Feather" manipulated the CD player, and erroneously hit the bass woofer switch which turned on a red light of the CD player. It illuminated Caylor in all his clothes and typical haircut. Caylor then shuffled with small thumping steps back into the cabinet, and Heagerty stated that he had heard the same thumping sounds during many previous séances when Caylor's "spirits" had been active. On the second occasion, "Yellow Feather" left the cabinet carrying an apparently rather bright spirit light. With the exception of one guest who didn't wear glasses that night, all other sitters present clearly recognized Caylor, who spoke in the voice of "Yellow Feather," and shuffled around in front of them in the clothes he wore when he entered the séance room and the cabinet.

It appears particularly suspicious that around that time, Caylor insisted on being fastened with cable ties around his wrists, but with ropes and a knot around his legs (Heagerty 2009). When Heagerty and other sitters were once allowed to examine the empty chair in very dim light after Caylor's body had allegedly been dematerialized (but still might be hidden in a dark corner of the room), the empty cable ties were still on the chair's arms, but the ropes for the legs were nowhere to be found. After another séance

witnessed by Brown, the knots securing Caylor's legs differed considerably from the sophisticated knots that were installed before the séance, indicating that Caylor might have loosened the original knots during the séance and replaced them later with more ordinary knots in the dark (Anonymous 2009). Heagerty (2009) also noted with concern that "Yellow Feather's" hands always felt just like Caylor's own somewhat characteristic hands when they touched them.

More recently, Caylor was allegedly caught cheating in early November 2014 in the course of giving séances at the Wallacia Development Center in Australia, once more having seemingly freed himself from the bonds on the chair and enacting alleged spirits. He was sent straight back home to England. Thereafter, he publicly announced on December 4, 2014, on the forum *Physical Mediumship For You*, an Internet forum for physical mediumship (<http://physicalmediumship4u.ning.com>), that he will start to develop holding séances in candlelight or red light from start to finish to prove that his phenomena are genuine. Moreover, Caylor claimed that in the future the use of cameras would be welcome during his séances (this episode can be followed at <http://www.spiritualismlink.com/t91-warren-caylor>). In fact, somebody who participated in a sitting with Caylor in 2017 asked him about the possibilities of filming his séances. This sitter informed me that Caylor affirmed that his séances could be filmed at any time with his consent, he only didn't like to be filmed secretly.

Until the present, however, all this is still not the case, thus representing a typical example of what I called "promissory mediumship." Promissory mediums continuously try to keep the interest in their mediumship alive by advancing promises regarding future developments of phenomena and control methods that are finally never kept—or are kept in only such a form that they always remain unsatisfying (Nahm 2015). Similarly, Caylor has shown a conspicuous aversion to scientifically motivated attempts to control his body during séances, although he also stated in public that he is eagerly willing to be tested under any condition deemed necessary by scientists (e.g., Anonymous 2008). Admittedly, Caylor claims that he once was secured properly at an event at Castle Vale in 2008. It seems, however, that no experienced scientists were present on this occasion, and the available descriptions of the applied controls and the present sitters are too general and too credulous to draw reliable conclusions from them (Jon 2008). Nevertheless, his former friend and defender Brown was present on that occasion, and, as mentioned before, he withdrew his support of Caylor not long after (Anonymous 2009).

Yet, given that Caylor had allowed the installation of multiple microphones in the séance room that continuously recorded what went

on, and which rendered the retrospective visualization of the location and the movements of his “spirit voices” possible, and given that Caylor was “very excited to literally see (in the 3D representations) what is going on in his séances” (Kruse 2018a:55), and that he announced permission to hold complete séances in dim light and/or to let them be filmed, one should reasonably expect that Caylor will now finally welcome the use of thermal imaging. After all, there is practically no difference between this documentation technique and that employed by Kruse: Microphones passively record audio signals that allow for a retrospective visualization of what goes on, and thermal cameras passively record temperature signals (precisely speaking, electromagnetic radiation) that allow for a retrospective visualization of what went on. Kruse owns the necessary equipment for thermal imaging, and he even recorded a séance of Mychael Shane at the Basel Psi Association (yet, because no phenomena occurred in the space between the circle of sitters, he didn’t record anything of significance regarding the question if such phenomena might have been genuine or not; see Kruse 2017e, 2017f). Therefore, I hope Kruse will insist that Caylor now let him use thermal imaging during typical séances as well. In this manner, Caylor and his followers, but also his critics, could see even better “what is going on in his séances.”

Comment on Eckhard Kruse’s Analyses of Warren Caylor’s “Spirit Voices”

Finally, I’ll add a comment on Kruse’s formant analyses of Caylor’s “spirit voices.” Kruse analyzed the voices of several “spirits” of Caylor, including that of the notorious “Yellow Feather,” who, as described above, was reportedly identified as Caylor himself on several occasions, even by former friends and circle members of his. However, Kruse put the most weight on the characteristics of the voice of a little “spirit boy” called “Tommy.” It seems difficult to tell who “Tommy” is. Several years ago, “Tommy” stated that he never lived on the earth plane (Heagerty 2009). More recently, Caylor informed a sitter who visited one of his séances that “Tommy” spoke only Russian when he first appeared in his séances, and then had to learn English. This must have worked well, because “Tommy” speaks fluent English without the slightest Russian accent. Even more curiously, “Tommy’s” voice sounds utterly disguised, like a very coarse whispering of a grownup man, and not at all like a child’s voice (for recordings of “Tommy” and several other “spirits,” see for example <https://wcaylor.wordpress.com/tag/caylor/>). However, Kruse stressed that according to his voice analyses, and to formant characteristics of children as presented by Huber et al. (1999), the

formants of “Tommy’s” voice nevertheless conform to those of a child. This is the core of Kruse’s argument, because he believes that it is impossible for grownup men to shift their formants F3 or F4 into the range of 8–10-year-old children. For example, the frequency of F4 of Caylor’s normal voice differs by about 1 kHz from “Tommy’s” F4 frequency.

To demonstrate that even professional comedians who purposefully disguise their voice are unable to match the formant differences that exist between Caylor’s and “Tommy’s” voices, Kruse compared the formants of Caylor’s “spirits” to those of German comedian Marc-Uwe Kling and his “Kangaroo” (e.g., Kruse 2016b, 2017a, 2017b, 2017c, 2018a). But obviously this approach is illegitimate from a scientific perspective. In comparison with Caylor’s “spirits,” Kling changes his voice only very slightly when he impersonates the “Kangaroo,” and thus it is no surprise that the formants of Kling’s original voice differ only slightly from those of his “Kangaroo.” Evidently, the legitimate control group Kruse should have employed would have consisted of grownup men who tried to imitate Caylor’s “spirits” as closely as possible. Then, Kruse should have analyzed the differences in the formant frequencies of their normal and their disguised voices to put them in relation to Caylor’s “spirits.”

Since I was asked several times by critical participants of Caylor’s séances about my opinion on Kruse’s investigation, and because Kruse announced on his website that he would perform further comparative voice analyses in addition to the analyses of Kling’s voices, and invited interested readers to contact him, I eventually asked him whether he intended to perform further comparative voice analyses using an appropriate control group as described above. However, Kruse brusquely refused. Apparently, he firmly believed that nobody can raise F3 or F4 by 1 kHz. He claimed my suggestion would question the foundations of voice forensics, and would thus constitute a waste of effort he didn’t want to deal with (email communication to the author on December 7, 2017).

Somewhat surprised by this reply, I attempted to imitate “Tommy’s” voice, and to analyze it myself. I recorded vowel samples and analyzed their formant frequencies with the software *Praat*, the program used by Kruse. These analyses seemed to show that when I imitated “Tommy’s” voice, formant F4 can easily be raised by 1 kHz or even higher, compared with my normal voice. In general, it is not difficult to perform the basic formant analyses with *Praat*. Yet, there are a few stepping stones in that, for example, *Praat* doesn’t always distinguish properly between F4 and F5 when the frequency of F4 reaches close to 5 kHz. Nevertheless, even when I chose different settings for the formant analyses, the results showed that I was able to raise F4 by about 1 kHz. Still, to be on the safe side, I sent examples

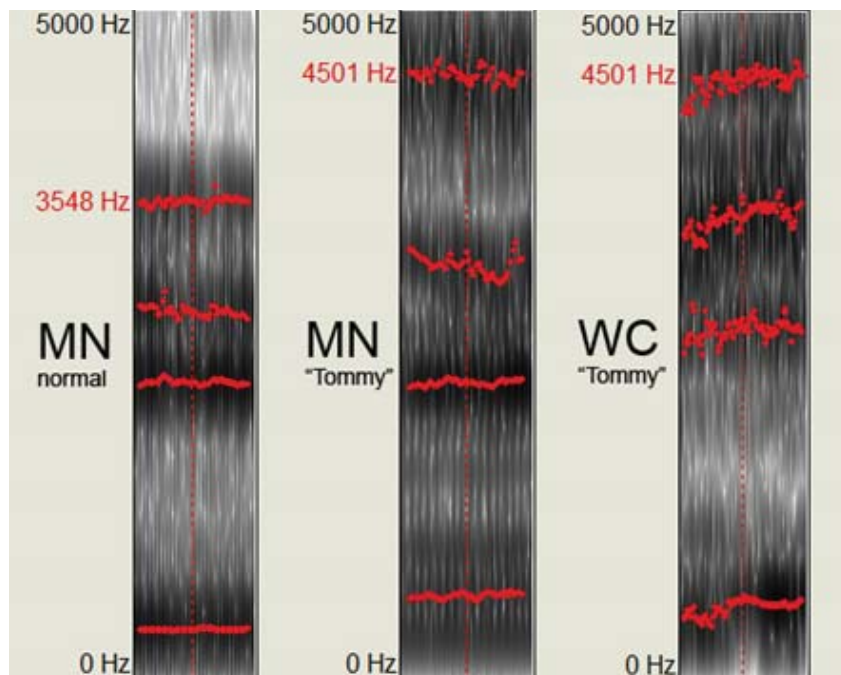


Figure 1. Graphical display of the formant analyses of samples of the vowel /e/, analyzed with the software Praat. The four red bars on each subplot represent formants F1–F4, the latter is located at the top. The analyses show that I can lift the frequency of F4 by about 1,000 Hz when I imitate the vowel /e/ as it is spoken by the supposed spirit “Tommy,” and that my “Tommy”-F4 is practically identical to that of the real “Tommy” (MN normal = /e/ in Michael Nahm’s normal voice; MN “Tommy” = /e/ in Michael Nahm’s voice imitating “Tommy”; WC “Tommy” = /e/ drawn from a recording of a séance with Warren Caylor). The three vowel samples have a length of about 0.3–0.5 seconds.

of my vowel recordings to a professional linguistic laboratory to let their formants be determined, but without providing further information about the nature of these samples and the reasons for my request. And indeed, the results returned by this laboratory displayed a difference of about 1 kHz in F4 in my vowel samples, and thus confirmed the overall correctness of my formant analyses.

The left part of Figure 1 shows formants F1–F4 of the vowel /e/, spoken with my normal voice. The four formants are indicated by the four red bars. F4 lies at about 3.5 kHz. The middle part of Figure 1 shows F1–F4 for the vowel /e/, but this time I imitated the typical coarse whispering of “Tommy.” F4 now lies at about 4.5 kHz, i.e. 1 kHz higher. The right part

of Figure 1 shows F1–F4 of a vocal sample from a séance of Caylor’s, and gives an impression of how “Tommy” sounds when uttering the sustained vowel /e/. It is apparent that these formant frequencies and those of my imitation are very similar. In both cases, F4 lies at about 4.5 kHz. Hence, it seems likely that the main formant characteristics of Caylor’s “spirit voices,” including that of “Tommy,” can be replicated by anybody who is able to imitate the crucial characteristics of Caylor’s “spirit voices” closely enough.

In addition, contrary to Kruse’s belief that according to voice forensics, the F3 and F4 of one’s voice cannot be altered significantly (e.g., Kruse 2016b, 2016c, 2018a), it is in fact long known that people can modulate the frequencies of F3 and F4 within a range of up to 1 kHz by moving their larynx upward or downward in the normal speaking voice pitch—that means, without even disguising one’s voice as drastically as it is required to imitate Caylor’s “spirit voices” (Sundberg & Nordström 1976). Indeed, when I imitated “Tommy’s” voice, I needed to draw my larynx greatly upward, which must result in a significant lift in formant F4’s frequency. Hence, Kruse’s reiterating references to voice forensics and the alleged invariance of the frequencies of F3 and F4 in his publications, talks, and interviews are misplaced—and even more so because comparative voice analyses performed in voice forensics are hardly concerned with voices that are disguised in such an extreme manner as required to imitate the voice of, for instance, “Tommy.”

The analytical approach I chose, namely using vowel samples of sustained monophthongs to determine their formant frequencies, is a common approach in voice analyses (e.g., Sundberg & Nordström 1976, Huber et al. 1999) because the formants of vowels rather than those of consonants determine the dominant characteristics of one’s voice, and because the formants of sustained vowels can be determined most reliably (O’Shaughnessy 2008).⁶ My approach lies also at the heart of Kruse’s own argumentation which builds on the study performed by Huber et al. (1999), who used recordings of the sustained vowel /a/ to determine typical formant frequencies of children of different ages. Summing up, Kruse’s belief that it is unlikely that a single person can (re-)produce the different voices of Caylor’s “spirits” including their formant frequencies (e.g., Kruse 2016c, 2018a), and that his analyses “knock the bottom out of the usual fraud hypotheses” (Kruse 2016b:95; my translation), is neither supported by appropriately obtained experimental data nor by the available literature on voice analyses.

Concluding Comments

To conclude, Kruse only documented and visualized what is trivial and obvious to any participant in Caylor’s séances—namely, that different voices move around in the dark space between the sitters. Kruse’s approach is, at least in its present form, unsuited for evaluating the possible nature of these voices. An interesting audio-based alternative for testing the authenticity of alleged “spirits” such as “Yellow Feather” and “Tommy” consists in applying linguistic assessments of their speech (Thomason 1989). What is worse, the ongoing dissemination of Kruse’s untenable interpretation of his study misleads the public and creates wrong expectations concerning the nature of the documented séance-room phenomena, and it thus does an unfortunate disservice to serious research into alleged phenomena of physical mediumship.

Other technologies such as thermal or infrared imaging are much better suited than Kruse’s approach of audio signal processing to assess the origins of voices perceived in dark séance rooms. Because Caylor has repeatedly offered to let his séances be filmed, Kruse should take that opportunity and use his thermal-imaging equipment. Moreover, applying responsible and more stringent controls of alleged mediums is indispensable for future studies of mediumship with a scientific entitlement—especially when suboptimal methodological approaches such as audio signal processing instead of visual documentation techniques are employed. Although Kruse utilizes innovative technical devices and skillfully creates software scripts that generate colorful images, his research takes the second step before the first step, and this second step lacks a reasonable methodological approach and the necessary critical distance (for a more promising example, see Gimeno & Burgo 2017). One hopes Kruse will not have to repeat the words of the disillusioned Frank Brown regarding his earlier public promoting of Caylor’s supposed mediumship after being closely engaged with him for more than 5 years: “My realisation came very late and the damage has been done, but I’m now trying to redress that” (Anonymous 2009:4).

Notes

¹ Mügge has even confessed that he purposefully obtained and employed a magician’s LED-device, the effects of which he glorified as “spectacular spirit lights” on his blog. He employed this device during the final “ectoplasm” displays of several séances between 2011 and 2013, including a sitting I attended, and at least two sittings at the Basel Psi

Association. This implies that (at least!) the “ectoplasm” and his trance personality “Hans Bender” were purposefully faked when he used this device. In fact, Mügge’s former circle leader Jochen Soederling found such an LED-device in Mügge’s travel bag, and he informed me and Stephen Braude about this incident in spring 2014 (this entire episode is described in Braude 2016). Nevertheless, Mügge fervently denies all this. As I was informed via several sources, he spreads (in rather unfriendly terminology) the claim in the “physical mediumship scene” that I blackmailed Jochen to fabricate and publish the stories about the LED-device in Mügge’s travel bag and his alleged confession to Jochen, and that Stephen Braude published these fabrications although he knew they were false. Nevertheless, it is easy to prove that this is a simple and transparent (and quite unspiritual) fabrication by Mügge, aimed at demonizing me, Stephen, and our work, to save his hide. Of course, there is a mountain of email correspondence, dating from spring 2014 to 2016, among me, Stephen, and Jochen; and, among others, it also includes Robert Narholz, Hermann Haushahn, Lucius Werthmüller, and Mügge himself. This correspondence establishes beyond the shadow of a doubt that the episode concerning Mügge’s confession and the LED device in his travel bag is no fabrication, and occurred precisely as described by Jochen in Braude (2016). In one particularly interesting email to me of April 6, 2014, Mügge even submitted that some phenomena of his public sittings were indeed staged—in contrast to phenomena at “scientific” sittings such as those conducted in Austria in 2013 (compare especially Braude 2014:331). Copies of this and of other relevant emails from this correspondence, but also the photo series described in Nahm (2014) and other unmasking materials, are deposited at the Institute for Frontier Areas of Psychology and Mental Health in Freiburg. They can be viewed upon request. At present, Mügge specializes in presenting extremely suspicious full materializations of disguised “spirits” in dim red light. Measures to control him during such displays are not applied.

² Conspicuously, at such public sittings for paying guests, the crucial details of the control methods are always prescribed by the “mediums” themselves.

³ The spirit guides of Mychael Shane are “Ascended Masters of Shamballah” who include Gautama Buddha, Jesus Christ, and a certain “St. Germain” (Shane no date). According to Warren Caylor, the glass jewelry “apported” in his séances (also termed “activation stones,” like the glass jewelry “apported” by Kai Mügge) also originates in “shembala” [sic] and is mediated by apparently the same “ascended masters” such as “St. Germain” (see <http://www.spiritualismlink.com/t91p200-warren-caylor>).

- ⁴ As described in the main text, the quality of arm controls with cable ties can be tested very easily, playfully, and non-invasively. One just needs to tighten a second cable tie exactly in parallel to the first one around a medium's wrists, and cut and remove it before the séance begins. This tie can then be used as a precise template to re-enact the binding of the medium. After the séance, sitters could test themselves to see if they can slip their hands and feet out of cable ties that are tightened to exactly the same position of the template, and thus, also of the original ties the medium's wrists were secured with. It would also be interesting to examine how much far different sizes of hands would make a crucial difference with regard to freeing them. Yet, it is very important to use ties as a template that were obtained *before* the séance, as there are indications that certain mediums fasten their ties further during séances, most likely toward the end and using their teeth; so that when controllers are asked to thoroughly inspect the ties again before removing them in full light, it would indeed seem impossible to slip one's hand out of them.
- ⁵ Interestingly, full materializations of "Louis Armstrong," "Michael Jackson," and the "spirit" of Winston Churchill also appear in séances of other contemporary commercial "mediums." Still, these "spirits" behave quite differently with the different "mediums." For example, the materialized "Louis Armstrong" of David Thompson loves to play a materialized harmonica. For more information about Thompson, see, e.g., Anonymous (2016c) and several threads at <http://www.spiritualismlink.com/f5-physical-mediumship>. At a séance with Thompson I attended in 2011 at the Basel Psi Association, even the fake "Hans Bender" of Mügge materialized in the dark and spoke to Mügge, who was present as a guest. At the next séance with Mügge in Basel, the latter's "Hans Bender" affirmed his appearance through Thompson's mediumship. These two "mediums" were friends at that time and mutually praised these remarkable events on the forum *Physical Mediumship 4U*, an Internet forum for physical mediumship (<http://physicalmediumship4u.ning.com>). However, the "Louis Armstrong" of Chris Howarth doesn't play materialized harmonica at all, but he loves to dance with female sitters in the dark (Anonymous 2016d). Conspicuously, the "Louis Armstrong" of Warren Caylor neither plays the harmonica nor does he invite lady sitters for a dance. In Howarth's séances, "Michael Jackson" also drops in sometimes for a dance with sitters, whereas Caylor's "Michael Jackson" doesn't dance with sitters but faintly sings along to his own songs. It is certainly a pity that these famous "spirits" cannot be seen in the dark, and that sometimes they are also difficult to touch. When some of the supposed dancing partners entered the dance floor in Howarth's séances full of expectation, nobody

was there to dance with. They simply had to sway to the music alone and in darkness until it stopped (Anonymous 2016d).

- ⁶ In fact, formants in spoken words are typically determined in vowel sequences with durations of only milliseconds (Rosenberg, Bimbot, & Parthasarathy 2008; see also Morrison & Assmann 2013).

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