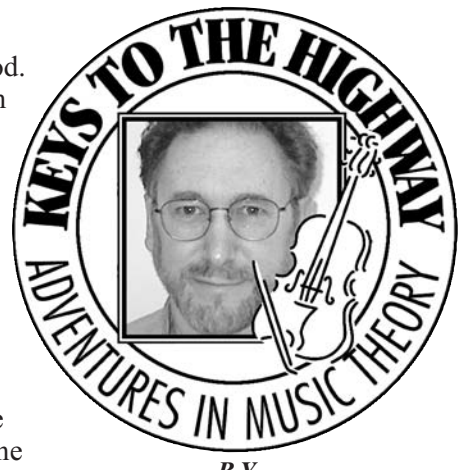
Thinking Outside of the Box

THE STRANGE TALE OF LEON THEREMIN



BY ROGER GOODMAN

I have tried throughout this series of articles to encourage you to "think outside the box" when it comes to music. Anything specific learned or done with music always has some underlying rules or principals behind it. What you are usually dealing with is a specific application or, in essence, a special case of a more general set of rules. The trick is to learn not only the specifics but to abstract out the generalities. In so doing you have converted your static knowledge into a portable form that can now be re-applied in many other places (see **Table 1**). What could be more brilliant or creative than that?

Table 1 - Thinking Outside the Box

WHAT	**Thinking Inside the Box**	**Thinking Outside the Box**	**Thinking Inside a New Box**
HOW	Start with Specific Information	Generalize / Abstract	Re-apply Elsewhere
EXAMPLE 1			
Music Theory	Notice that a C major chord is C-E-G.	Generalize that C-E-G is 1-3-5 of the C scale.	A G major chord can be found to be G-B-D by taking 1-3-5 from a G scale.
EXAMPLE 2			
Musical Instrument	Learning to play a specific instrument.	Analyzing what you do to play that instrument.	Playing a 2nd instrument using what you learned from the first.

My interest in music has led me to learn about fascinating instruments and the people that created them. They are almost always individuals who think outside of the box. In this article, I would like to tell you the fantastic story of Lev Sergeivitch Terman (1896-1993), a Russian prodigy who not only thought outside of the box but also "played" outside of the box. Lev, who later changed his name to Léon Théremin (**Figure 1**), had studied physics at the University of Saint Petersberg and also music theory and cello at the Musical Institute. While working at a Soviet scientific think tank and conducting research on a device to measure the density of gas under pressure, he accidentally noticed that the device was sensitive to the motions of his hands. You may have noticed a similar phenomenon when you walk by a TV or an FM antenna and interfere with the reception. Hooking up earphones he discovered that the circuit produced a tone that he could control with the movements of his hands.

Fig. 1

Even as a young cellist Theremin had already felt confined by the mechanics of playing a musical instrument and thought that a musician should be free of such limits and somehow have direct access to creative musical expression. In a 1989 interview with musicologist Olivia Mattis, Theremin said, "I wanted to invent … an instrument that would not operate mechanically ... that would create sound without using any mechanical energy, like the conductor of an orchestra. The orchestra plays mechanically, using mechanical energy, [but] the conductor just moves his hands, and his movements have an effect on the music."

Fig. 2

Theremin's new instrument was the first electronic instrument ever invented and is still the only musical instrument that is played without being touched. Theremin's original instrument looked like a wooden radio cabinet with a straight antennae coming out of the top and a loop antennae on the side. Inside was a 12-tube circuit (**Figure 2**) that used a beat frequency oscillator (see the previous article on beat frequencies at www.FolkWorks.org) to produce and amplify a tone that sounded very much like a bowed violin string. When played, the right hand controlled the pitch as it moved near the vertical antennae and the left hand controlled the volume as it interacted with the voltage field about the horizontal antennae.

Fig. 8

Theremin perfected his new instrument called, at various times, the Ætherphone, the Heterophone, the Termenvoksa and eventually the Theremin and presented it at a conference of Electrotechnicians in Moscow. Lenin summoned Theremin for a private demonstration and decided that Theremin's invention would be a good propaganda tool to advance the cause of Communism and show off the scientific progress of the new soviet socialist republic. Theremin toured all the great capitols of Europe to such eager audiences that while appearing in Paris with Ravel & Respighi in attendance, so many people had to be turned away that there were near riots. At the end of 1927 the 31-year-old Theremin came to the USA and immediately became the darling of the creative, scientific and elite society attracting patrons, students and followers. His most faithful supporter, a music connoisseur named Lucie Bigelow Rosen (**Figure 8**), was the wife of a wealthy banker. "Theremin's high priestess," as nicknamed by the New York Times, set him up with a studio and huge sums of money to perfect his instrument. By 1930 RCA was manufacturing their version of the Thereminvox and sold about 500 instruments.

Fig. 3

Fig. 4

In the midst of this emerged a true Theremin virtuoso in the person of Clara Rockmore (1910-1998) (**Figures 3 & 4**). She had been a violin prodigy but her bowing arm was damaged as a result of her malnourished Russian childhood. She elevated the new instrument from being considered a novelty to the level of a serious virtuoso classical instrument. She gave hundreds of concerts throughout the 1930's, 40's and 50's. She worked closely with Leon Theremin and most of the major improvements in the instrument were at her suggestion and insistence. In the 1940's and 50's the Theremin began to be used for sound-effect background-music in low budget mostly science-fiction movies. Clara Rockmore felt it beneath the dignity of the instrument and refused to participate. Thereminist Dr. Samuel Hoffman is therefore responsible for most of the Theremin music heard in the movies from that era. You can hear his Theremin in *The Lost Weekend* and the Oscar-winning *Spellbound*.

In 1938 Leon Theremin suddenly went back to Russia. It was reported that the NKVD (the predecessor of the KGB) kidnapped him and spirited him back to the USSR where he was sent to the labor camps for the crime of anti-Soviet propaganda. He was in the gulags and camps for seven years and then remained under house arrest until 1947. The Soviets fostered the rumor that he had been executed and put him to work on top-secret research where he invented the first electronic eavesdropping devices or "bugs" and, using the same principals as in the Theremin, constructed the first motion-sensing electronic alarm systems. Later, when people found out he was still alive and living in a modest apartment in Moscow, they were informed that since he had been involved in secret research he was not allowed visitors or travel.

The rumors and facts are so mixed together that they are difficult to untangle. Some say that he never got over Clara Reisenberg's marriage to Robert Rockmore, that he married someone else on the rebound and then left before the marriage was six months old. Others say that he had skipped out on some rather large debts and returned to a different Soviet Union where he was no longer in favor. Still others say that he was a Soviet spy from the beginning, sent by Lenin to learn about American technology and to feel out what side the U.S. would take if there should be a war.

Fig. 9

The Theremin influence has continued. Robert Moog (**Figure 9**) built a Theremin from a kit when he was a teenager and continued to develop, manufacture and sell the instrument providing him with the finances to develop the Moog synthesizer that changed the face of modern music. Lydia Kavina (**Figures 5 & 6**), Theremin's cousin, still performs and is probably the best Thereminist since Clara Rockmore.

Fig. 6

Fig. 5

All of this is a rather extreme example of "thinking outside of the box." The mechanics of most musical instruments allow you to communicate your information to the instrument so that it can produce the melody that you want (thinking inside the box). So what is that information? It is essentially pitch and volume (thinking outside the box). Theremin found a way to communicate that information that didn't even require any physical contact (thinking inside a new box). Besides thinking outside the box he also made an instrument that is literally played "outside the box."

So keep looking for the underlying rules and structure in your music, think "outside the box" and of course stay tuned.

ON THE WEB:

Play a virtual Theremin at theremin.info/. Many Theremin links on this site. Available at www.amazon.com and elsewhere:

Video: *Theremin: An Electronic Odyssey* (1995)
CD: Clara Rockmore - *The Art Of The Theremin*
CD: Lydia Kavina - *Music from the Ether: Original Works for Theremin*

Roger Goodman is a musician, mathematician, punster, reader of esoteric books and sometime writer, none of which pays the mortgage. For that, he is a computer network guy for a law firm. He has been part of the Los Angeles old-time & contra-dance music community for over thirty years. While not a dancer, he does play fiddle, guitar, harmonica, mandolin, banjo & spoons. Roger has a penchant for trivia and obscura and sometimes tries to explain how the clock works when asked only for the time. He lives with his wife, Monika White, in Santa Monica, CA.